

RFI Work Plan

**Delaware Valley Works Facility
Claymont, Delaware**

Volume 1 of 2

**General Chemical Corporation
Parsippany, New Jersey**

**Project No. 5455
December 2000
Revised May 2002**

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**RFI Work Plan
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Table of Contents

	<u>Page</u>
Index of Acronyms	vi
Introduction	viii
1.0 Task 1 – DOCC	1-1
1.1 Introduction	1-1
1.2 Facility Description	1-1
1.2.1 Facility Location and Access	1-1
1.2.2 DVW History and Operations	1-2
1.2.3 SWMUs and AOCs	1-2
1.2.4 Relevant Spills and Releases	1-5
1.2.5 Regulatory History and Permits	1-5
1.3 CFM	1-6
1.3.1 Environmental Setting and Surroundings	1-7
1.3.2 Climate and Meteorology	1-7
1.3.3 Topography and Surface Drainage	1-8
1.3.4 Regional Geologic and Hydrogeologic Setting	1-8
1.3.5 Facility Subsurface Conditions	1-9
1.3.5.1 Geologic Conditions	1-10
1.3.5.2 Hydrogeologic Conditions	1-11
1.3.6 Land and Water Use	1-12
1.3.6.1 Current Land Use	1-13
1.3.6.2 Historic Development Patterns	1-13
1.3.6.3 Population Growth Patterns and Projections	1-13
1.3.6.4 Cultural Factors	1-14
1.3.6.5 Floodplain	1-14
1.3.6.6 Wetlands	1-14
1.3.6.7 Groundwater Uses/Wellhead Protection	1-14
1.3.7 Fate and Transport	1-16
1.3.7.1 Chemical and Physical Properties	1-17
1.3.7.2 Potential Migration Pathways	1-19
1.3.7.3 Potential Human Receptors	1-20
1.3.7.4 Potential Ecological Receptors	1-22
1.3.7.5 CFM Summary	1-22
1.4 DOCC – SWMUs/AOCs	1-22
1.4.1 SWMU 1 – Phosphoric Acid Storage Pond (North Pond)	1-23
1.4.2 SWMU 2 – Phosphoric Acid Storage Pond (South Pond)	1-23
1.4.3 SWMU 3 – Red Mud Slurry Pond A	1-23
1.4.4 SWMU 4 – Red Mud Slurry Pond B	1-24
1.4.5 SWMU 5 – Spar Building Storage Area	1-25
1.4.6 SWMU 6 – Drum Storage, South Treatment Plant	1-25
1.4.7 SWMU 7 – Effluent Clarifier Tank	1-25
1.4.8 SWMU 8 – Effluent Clarifier Tank	1-26
1.4.9 SWMU 10 – South Waste Treatment Storage Pad	1-26
1.4.10 SWMU 11 – Waste Oil AST	1-26

Table of Contents (Continued)

	<u>Page</u>
1.4.11 SWMU 12 – Waste Oil UST	1-27
1.4.12 SWMU 16 – Past Landfill–Area IV	1-27
1.4.13 SWMU 21 – Past Landfill–Area IX	1-27
1.4.14 SWMU 22 – Past Landfill–Area X	1-28
1.4.15 SWMU 23 – Past Landfill–Area XI	1-28
1.4.16 SWMU 24 – RCRA Storage Area	1-28
1.4.17 SWMU 25 – Sulfuric/Oxalic Storage Tanks	1-29
1.4.18 SWMU 26 – South Waste Treatment Plant	1-29
1.4.19 SWMU 27 – EPS–North	1-30
1.4.20 SWMU 28 – Hypo Muds Accumulation	1-31
1.4.21 SWMU 30 – East and West Lagoons	1-31
1.4.22 SWMU 31 – Spent Acid Lagoon	1-32
1.4.23 SWMU 32 – Former UST Area	1-33
1.4.24 AOC 1 – Tank 15 Spill Area	1-33
1.4.25 AOC 2 – Acid Spill Area	1-33
1.4.26 AOC 3 – Pesticide Investigation/Remediation Areas (North Plant)	1-34
1.4.27 AOC 4 – Conrail Fuel Spill Area	1-34
1.5 Previous Investigations	1-34
1.5.1 SWMU 30 – East and West Lagoons	1-35
1.5.2 SWMU 31 – Spent Acid Lagoon	1-36
1.5.3 SWMU 32 – Former UST Area	1-38
1.5.4 AOC 2 – Acid Spill Area	1-39
1.5.5 AOC 3 – Pesticides Investigation/Remediation Areas (North Plant)	1-40

Tables

Table 1-1 - Summary of Solid Waste Management Units and Areas of Concern	
Table 1-2 - Summary of Permits	
Table 1-3 - List of Contacts	
Table 1-4 - Monitoring Well Installation and Status Summary	
Table 1-5 - Water Table Elevations	
Table 1-6 - Estimated Hydraulic Conductivity Values	
Table 1-7 - Soil Sampling Results, Former UST Area (SWMU 32)	
Table 1-8 - Groundwater Sampling Results, Former UST Area (SWMU 32)	
Table 1-9 - Soil Chemistry Data, Pesticide Investigation-Part I (AOC 3)	
Table 1-10 - Soil Chemistry Data, Pesticide Investigation-Part II (AOC 3)	
Table 1-11 - Soil Chemistry Data, Pesticide Investigation-Part III (AOC 3)	

2.0 Task II – Preinvestigation Evaluation of Corrective Measures Technologies	2-1
2.1 Introduction	2-1
2.2 Corrective Action Objectives	2-1
2.3 General Response Actions	2-2
2.3.1 No Action	2-2
2.3.2 Institutional Controls	2-2
2.3.3 Containment	2-3
2.3.4 Removal	2-3

Table of Contents (Continued)

	<u>Page</u>
2.3.5 Disposal	2-3
2.3.6 Treatment	2-3
2.4 Identification and Screening of Technologies/Process Options	2-3
2.4.1 Screening of Technologies/Process Options for Solid Matrices	2-4
2.4.2 Screening of Technologies/Process Options for Aqueous Matrices	2-5
2.5 Evaluation Criteria	2-6
2.6 Data Requirements	2-7
2.6.1 Solid Phase Data Requirements	2-8
2.6.2 Aqueous/Liquid Phase Data Requirements	2-8
Tables	
Table 2-1 - Preliminary Screening of Solid Matrix Technologies and Process Options	
Table 2-2 - Preliminary Screening of Aqueous Matrix Technologies and Process Options	
3.0 Task III – RFI Work Plan Requirements	3-1
3.1 Project Management Plan	3-1
3.2 DCQAP	3-2
3.3 Data Management Plan	3-2
3.3.1 Data Record	3-2
3.3.2 Information Displays	3-3
3.3.3 Reports	3-4
3.3.4 Final RFI Report	3-4
3.4 Community Relations Plan	3-4
3.4.1 Facility Location and Setting	3-4
3.4.2 Description of the Local Community	3-5
3.4.3 Community Relations Activities	3-5
3.4.4 Modifications to the Community Relations Plan	3-6
3.5 Health and Safety Plan	3-6
4.0 Task IV – RFI Scope of Work	4-1
4.1 General Approach to Facility Characterization	4-1
4.2 Proposed Scope of Work	4-2
4.2.1 Soil Characterization	4-3
4.2.1.1 Program Overview	4-3
4.2.1.2 Soil Sampling and Analysis	4-4
4.2.1.2.1 SWMU 1 – Phosphoric Acid Storage Pond (North Pond)	4-4
4.2.1.2.2 SWMU 3 – Red Mud Slurry Pond A	4-4
4.2.1.2.3 SWMU 5 – Spar Building Storage Area	4-4
4.2.1.2.4 SWMU 6 – Drum Storage, South Treatment Plant	4-5
4.2.1.2.5 SWMU 10 – South Waste Treatment Storage Pad	4-5
4.2.1.2.6 SWMU 16 – Past Landfill-Area IV	4-6
4.2.1.2.7 SWMU 21 – Past Landfill-Area IX, SWMU 22 – Past Past Landfill-Area X, and SWMU 30 – East and West Lagoons	4-7
4.2.1.2.8 SWMU 23 – Past Landfill-Area XI	4-8

Table of Contents (Continued)

	<u>Page</u>
4.2.1.2.9 SWMU 27 – EPS–North	4-9
4.2.1.2.10 SWMU 28 – Hypo Muds Accumulation	4-9
4.2.1.2.11 AOC 1 – Tank 15 Spill Area	4-10
4.2.1.2.12 AOC 3 – Pesticide Investigation/Remediation Areas (North Plant)	4-10
4.2.1.2.13 AOC 4 – Conrail Fuel Spill Area	4-11
4.2.1.3 Soil Sampling Methods	4-12
4.2.2 Groundwater Characterization	4-12
4.2.2.1 Program Overview	4-12
4.2.2.2 Drilling Methods	4-15
4.2.2.3 Monitoring Well Construction	4-15
4.2.2.4 Well Development	4-16
4.2.2.5 Groundwater Sampling and Analysis	4-17
4.2.2.6 Groundwater Elevation Measurements	4-18
4.3 Surveying	4-18
4.4 Additional RFI Activities	4-19
4.5 Stabilization/Remedial Measures	4-19
4.6 Management of Investigatin Derived Wastes	4-19
4.7 Project Schedule	4-19
4.8 Project Staffing	4-20

Tables

Table 4-1 – Rationale for Soil Sampling at Solid Waste Management Units and Areas of Concern	
Table 4-2 – Summary of Work to Be Performed	
Table 4-3 – Analytical Methods and Quality Assurance Summary, Soil Sampling Program	
Table 4-4 – Proposed Groundwater Monitoring Locations	
Table 4-5 – Analytical Methods and Quality Assurance Summary, Groundwater Sampling Program	

5.0 Task V – Investigation Analysis	5-1
5.1 Human Health Risk Assessment	5-1
5.2 Ecological Risk Evaluation	5-3
6.0 Task VI – Laboratory and Bench Scale Studies	6-1
7.0 Task VII – Reports	7-1
7.1 Progress Reporting	7-1
7.2 RFI Reports	7-1

References

Figures

Figure 1 – Facility Location Map (Dwg 5455001)	
Figure 2 – Facility Layout, SWMU/AOC Locations and Historical Well Locations (Dwg 5455404)	

Table of Contents (Continued)

	<u>Page</u>
Figure 3 – Historical and Proposed Soil Sample Locations AOC 3 – Pesticide Investigation/ Remediation Areas (North Plant) (Dwg 5455405)	
Figure 4 – Land Use Features (Dwg 5455)	
Figure 5 – Schematic Geologic Cross-Section A-A (Dwg 5455411)	
Figure 6 – Proposed RFI Soil Sampling Locations SWMU 1 – North Phosphoric Acid Storage Pond (Dwg 5455005)	
Figure 7 – Proposed Soil Sampling Locations SWMU 16 – Past Landfill - Area IV (Dwg 5455006)	
Figure 8 – Proposed Soil Sampling Locations SWMUs 21, 22, and 30 – Past Landfill (Area IX), Past Landfill (Area X), and East and West Lagoons (Dwg 5455007)	
Figure 9 – Proposed Soil Sampling Locations SWMU 23 – Past Landfill (Area XI) (Dwg 5455004)	
Figure 10 – Proposed Soil Sampling Locations SWMU 27 (Dwg 5455013)	
Figure 11 – Proposed Soil Sampling Locations SWMU 28 (Dwg 5455010)	
Figure 12 – Proposed Soil Sampling Locations AOC 1 (Dwg 5455011)	
Figure 13 – Proposed Soil Sampling Locations AOC 4 (Dwg 5455009)	
Figure 14 – Proposed RFI Groundwater Monitoring Locations (Dwg 5455413)	
Figure 15 – Typical Well Installation Detail (Dwg 5455008)	
Figure 16 – Project Schedule, RFI Work Plan (Dwg 5455)	
Figure 17 – Project Organization Chart	

Appendices

Appendix A – RFA Document	
Appendix B – Facility NPDES and New Castle County Wastewater Discharge Permits	
Appendix C – Boring Logs and Well Installation Details	
Appendix D – Environmental Indicators Evaluation	
Appendix E – Facility Photographs	
Appendix F – North Plant Process Wastewater Flow Chart	
Appendix G – Spill Correspondence – Tank 15 (AOC 1) and Acid Spill Area (AOC 2)	
Appendix H – Historical Soil and/or Groundwater Data for East and West Lagoon (SWMU 30), Spent Acid Lagoon (SWMU 31), and the Acid Spill Area (AOC 2)	
Appendix I – Project Personnel Resumes	
Appendix J – Internal Memos	
Appendix K – Aerial Photographs	

Attachments

Attachment A – Data Collection Quality Assurance Project Plan	
Attachment B – Health and Safety Plan	

**List of Acronyms
RFI Work Plan
Delaware Valley Works
Claymont, Delaware**

µg/kg	Micrograms per Kilogram
µg/l	Micrograms per Liter
ACGIH	American Conference of Government Industrial Hygienists
AOC	Area of Concern
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
AWQC	Ambient Water Quality Criteria
bgs	Below Ground Surface
BHC	Benzene Hexachloride
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFM	Conceptual Facility Model
CFM	Conceptual Facility Model
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
cm/sec	Centimeters per Second
CMS	Corrective Measures Study
COPI	Constituents of Potential Concern
CRP	Community Relations Plan
DCQAP	Data Collection Quality Assurance Project Plan
DEP	Pennsylvania Department of Environmental Protection
DER	Pennsylvania Department of Environmental Resources
DNREC	Department of Natural Resources and Environmental Control
DO	Dissolved Oxygen
DOCC	Description of Current Conditions
DQOs	Data Quality Objectives
DVW	Delaware Valley Works
EI	Environmental Indicators
EPS	Environmental Protection Station
ERM	Environmental Resources Management, Inc.
GCC	General Chemical Corporation
GRA	General Response Action
HASP	Health and Safety Plan
IAO	Initial Administrative Order
IDLH	Immediately Dangerous to Life and Health
LD	Lab Director
MCL	Maximum Containment Level
mg/kg	Milligrams per Kilogram
mg/l	Milligrams per Liter
MSD	Matrix Spike Duplicate
NCC	New Castle County
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration

**List of Acronyms
(Continued)**

OSWER	Office of Solid Waste and Emergency Response
PAH	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PCP	Pentachlorophenol
PD	Project Director
PEL	Permissible Exposure Limit
PM	Project Manager
POTW	Publicly Owned Treatment Works
PPE	Personal Protective Equipment
PQL	Practical Quantitation Limits
QAM	Quality Assurance Manual
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RPD	Relative Percent Difference
SCBA	Self-Contained Breathing Apparatus
SVOC	Semivolatile Organic Compound
SWMU	Solid Waste Management Unit
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TICs	Tentatively Identified Compounds
TLV	Threshold Limit Value
TPH	Total Petroleum Hydrocarbons
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WBG	Wet Bulb Globe Temperature
WDP	Wastewater Discharge Permit
WRPA	Water Resource Protection Area

Introduction

This document presents a Work Plan to implement a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at the General Chemical Corporation (GCC) Delaware Valley Works (DVW) Facility located at 6300 Philadelphia Pike in Claymont, Delaware hereinafter referred to as the “Facility” or the “GCC Property” (see Figure 1). This Work Plan has been prepared to satisfy the requirements of the Initial Administrative Order (IAO) (Docket No. RCRA-3-089CA) issued by the U.S. Environmental Protection Agency, Region III (USEPA) to GCC, effective October 11, 2000.

The Facility owned by GCC is contiguous with the property currently owned by Honeywell International, Inc. (Honeywell [“the Honeywell Property”]). Prior to GCC, the Facility was owned and operated by Allied Chemical Corporation (Honeywell’s predecessor) together with the Honeywell Property. GCC and Allied Chemical Corporation completed an RFA in 1986 that identified 29 Solid Waste Management Units (SWMUs) on what are now the GCC and Honeywell properties. As agreed to between GCC and USEPA Region III, this Scope of Work applies only to real property currently owned by GCC. Honeywell is addressing SWMUs on its owned property pursuant to a Facility Lead Agreement with USEPA Region III. For practical purposes, GCC and Honeywell have agreed to subdivide several SWMUs that potentially straddle the property line. Due to the layout of the property, it is the intent of GCC and Honeywell to plan investigatory approaches with the other parties property in mind and, as much as possible, implement similar technical approaches and schedules for the work.

In light of the fact that the Facility is located partially in Pennsylvania and primarily in Delaware, USEPA Region III has agreed to coordinate its responses to GCC’s submissions and proposals so that GCC representatives will deal with only one team of reviewers thereby avoiding the redundancy and possible inconsistency of several different reviewing authorities.

The Work Plan is organized into seven sections, as follows:

- Chapter 1.0 (Task I) presents the Description of Current Conditions (DOCC) Report, which describes the available and relevant background information related to the Facility, the occurrence and distribution of constituents of potential interest (COPI) based on existing data. This section also includes a discussion of SWMUs/Areas of Concern (AOC), accidental spills/releases, and the conceptual Facility model for the Facility which includes the completed Environmental Indicators (EI) form.
- Chapter 2.0 (Task II) presents the Pre-Investigation Evaluation of Corrective Measures Technologies.

- Chapter 3.0 (Task III) presents the Work Plan attachments, including the Project Management Plan, Data Collection Quality Assurance Plan (DCQAP), Data Management Plan, Community Relations Plan, and Health and Safety Plan.
- Chapter 4.0 (Task IV) presents the RFI Scope of Work, including GCC's overall approach and general schedule for conducting Corrective Action at the Facility.
- Chapter 5.0 (Task V) presents the investigation analysis approach, including a discussion of the quality and quantity of data to be collected during the project to meet the project objectives.
- Chapter 6.0 (Task VI) presents a discussion of the approach for conducting laboratory and bench scale studies, if necessary, to determine the applicability of corrective measures technologies at the Facility.
- Chapter 7.0 (Task VII) presents a discussion of the procedures and requirements related to reporting for the project.

1.0 Task 1 – DOCC

1.1 Introduction

The following presents the DOCC for the facility. Sections 1.2 and 1.3 present information related to the current facility-wide conditions, including: a general facility description and definition of the facility boundary; a summary discussion of SWMUs and AOC; and a Conceptual Facility Model (CFM) that presents the environmental setting of the facility in relation to COPs and potential receptors. Section 1.4 presents detailed information for each SWMU and AOC and Section 1.5 summarizes previous investigations and/or closure/remediation activities conducted at individual SWMUs/AOCs.

1.2 Facility Description

1.2.1 Facility Location and Access

The facility is located at 6300 Philadelphia Pike in Claymont, Delaware 19703 (“the Facility”). The Facility is situated in a highly industrialized area that has witnessed heavy manufacturing, including both chemical and petrochemical, since the late 1800s. The property to the north and northeast is a refinery (Sun Oil Company), and the northern boundary of the Facility zigzags along a common boundary with Honeywell who conducts ongoing operations. The property to the west was formerly a petroleum products terminal and is now a salt terminal (Oceanport Industries, Inc.). The Delaware River forms the boundary of the Facility to the south. The general coordinates for the Facility are North 39 degrees, 48 minutes, and 45 seconds latitude and West 75 degrees, 26 minutes, and 15 seconds longitude. The Facility (both the “North Plant” and the “South Plant”) can be accessed by U.S. Route 13 (Philadelphia Pike) from the northeast and the southwest. The location of the Facility is shown on the U.S. Geological Survey (USGS) topographic quadrangle map included as Figure 1.

The Facility consists of three parcels of land which comprise approximately 100 acres, with one parcel located south of Philadelphia Pike (South Plant) and two parcels located north of Philadelphia Pike (North Plant). The South Plant is bisected from east to west by a Conrail right-of-way. The North Plant and the South Plant are referred to collectively as the DVW. The easternmost parcel on the North Plant is located entirely in Pennsylvania. The remaining parcels, which include the westernmost parcel on the North Plant and nearly the entire South Plant (except for the extreme northeastern corner of the South Plant), are located in Delaware. The Facility is contiguous with property owned by Honeywell, who is the owner and operator of a facility with an address of 6100 Philadelphia Pike. A Facility layout map showing the Facility boundaries and contiguous properties is included as Figure 2.

1.2.2 DVW History and Operations

Chemical operations at what is now the Facility began at the turn of the century. Land for the South Plant was purchased in 1910. Two years later, construction began on the sulfuric acid plant that marked the first commercial use of the contact or catalyst process. The plant began operation in 1913. The sulfuric acid and sulfur dioxide made in the plant formed the basis for all products at the South Plant. During World War I, the South Plant produced needed chemicals for the war effort. Increasing production prompted expansion into an idled chemical Facility in 1940. This new segment, the North Plant, began operation in 1945. Specialty chemicals have been the mainstay of the North Plant since then. In 1952, decomposition burners were added to the South Plant sulfuric acid unit. By 1955, the South Plant began to recover spent sulfuric acid from refinery alkylation units and other processes. Electronic chemical production was added in the 1970s.

GCC owns and operates a chemical manufacturing corporation located at 6300 Philadelphia Pike in Claymont, Delaware 19703. The Facility, which consists of approximately 100 acres, originates from two formerly separate plants known as the Baker and Adamson Works (B & A Works) in Marcus Hook, Pennsylvania (North Plant), and the Delaware Works in Claymont, Delaware (South Plant). Specifically, the entire South Plant is located in Delaware, and approximately two-thirds of the North Plant is located in Pennsylvania and one-third in Delaware. The two plants were previously owned by Allied Chemical Corporation, which became AlliedSignal Inc. (AlliedSignal), and is now known as Honeywell. AlliedSignal transferred portions of the two plants, identified as DVW to GCC on May 21, 1986 (at that time, GCC's name was One Newco, Inc. which was changed to General Chemical Corporation in June 1986).

The Facility manufactures more than 110 specialty and industrial chemicals. These products include sulphur- and fluorine-based chemicals, and warehousing and marketing of an array of other inorganic chemicals. The North Plant operations utilize batch reactors to make specialty chemical products and includes warehousing of chemicals. The South Plant operations produce sulfuric acid and make photochemical and water treatment products.

1.2.3 SWMUs and AOCs

GCC completed a RCRA Facility Assessment (RFA) in 1986. The RFA was designed to identify SWMUs and other AOCs and to evaluate the potential for release of constituents to the environment from these units. The overall objective of the RFA was to identify the potential for unregulated releases of

hazardous constituents to surface water, soils, groundwater, and air, and through subsurface gas generation. A copy of the RFA is contained in Appendix A.

The RFA identified 29 SWMUs at the DVW. Of these 29 SWMUs, 19 are located entirely on parcels owned by GCC, 5 straddle property owned by GCC and Honeywell, and the remaining five are located on Honeywell property. GCC and Honeywell have jointly agreed to each include three of the five SWMUs which straddle the properties lines in their respective Scopes of Work and investigate them in their entirety. Therefore, this RFI Work Plan for the Facility includes the 19 SWMUs located entirely on GCC property and two SWMUs (Nos. 21 and 22) that straddle the GCC and Honeywell property lines. In addition to these 21 SWMUs, and consistent with the requirements of the IAO and prior agreements during meetings with the USEPA and the Delaware Department of Natural Resources and Environmental Control (DNREC), GCC has identified three additional SWMUs and four AOCs that will be addressed as part of this RFI Work Plan. The existence and location of the SWMUs and AOCs were confirmed during several Facility inspections, a review of aerial photographs, interviews with Facility personnel, and/or during file reviews. The locations of the SWMUs and AOCs, with the exception of SWMU 29 and AOC 3, are shown in Figure 2.

SWMU 29 was identified as portable dumpsters located throughout the Facility and used to collect various nonhazardous wastes for off-Facility disposal. Locations of the dumpsters used to collect these materials were not specified; therefore, SWMU 29 is not shown on any figure. Given the nature of SWMU 29, investigations for this SWMU will not be performed and have not been included in this RFI Work Plan. AOC 3 was identified as several areas on the North Plant where pesticides had impacted soils. These areas are presented in Figure 3.

The 19 SWMUs located entirely on GCC property are presented below.

SWMU No.	Name
1	Phosphoric Acid Storage Pond (North Pond)
2	Phosphoric Acid Storage Pond (South Pond)
3	Red Mud Slurry Pond A
4	Red Mud Slurry Pond B
5	Spar Building Storage Area
6	Drum Storage, South Treatment Plant
7	Effluent Clarifier Tank
8	Alum Clarifier Tank
10	South Waste Treatment Storage Pad
11	Waste Oil Storage Aboveground Storage Tank (AST)
12	Waste Oil Storage Underground Storage Tank (UST)
✓ 16	Past Landfill–Area IV
✓ 23	Past Landfill–Area XI
✓ 24	RCRA Storage Area
✓ 25	Sulfuric/Oxalic Storages (2)
26	South Waste Treatment Plant
✓ 27	Environmental Protection Station (EPS)–North
28	Hypo Muds Accumulation
29	Misc. Nonhazardous Waste Collection Areas

The two SWMUs that straddle boundaries between GCC and Honeywell, which are included in this RFI Work Plan include:

SWMU No.	Name
✓ 21	Past Landfill–Area IX
✓ 22	Past Landfill–Area X

The seven additional areas that were identified that will be addressed in this RFI Work Plan include:

SWMU No./AOC	Name
✓ SWMU 30	East and West Lagoons
SWMU 31	Spent Acid Lagoon
SWMU 32	Former UST Area
AOC 1	Tank 15 Spill Area
AOC 2	Acid Spill Area
✓ AOC 3	Pesticide Investigation/Remediation Areas
AOC 4	Conrail Fuel Spill Area

Table 1-1 summarizes the time period and occurrence, size, materials handled, and provides a general description and current status of the SWMUs and AOCs. The SWMUs and AOCs are also discussed further in Sections 1.4 and 1.5.

1.2.4 Relevant Spills and Releases

Available information maintained by GCC regarding relevant spills and releases is contained in Appendices G and H. Two documented spills of sulfuric acid at the Facility that require additional evaluation have been identified. In 1989, a spill of 1,000 to 15,000 gallons of sulfuric acid occurred at the southern portion of the South Plant. The approximate area of the spill is identified as AOC 2 in Figure 2. In September 1996, approximately 1,500 tons of sulfuric acid were released from Tank 15 into the secondary containment area. Tank 15 is located on the west central portion of the South Plant. After the 1,500 tons of sulfuric acid had released into the secondary containment area, a small leak in the secondary containment resulted in a minor amount of sulfuric acid to be released onto the ground surface outside the containment area. The Tank 15 Spill Area is identified as AOC 1 in Figure 2.

In addition, in the late 1970s, the fuel cell of a Conrail tank car was punctured which resulted in the release of several hundred gallons of diesel fuel along the rail line immediately east of the Spar Building Storage Area (SWMU 5). According to GCC personnel, the spill was remediated by Conrail under the oversight of DNREC. The approximate area of this spill is identified as AOC 4 in Figure 2.

1.2.5 Regulatory History and Permits

On July 28, 1980, Allied Chemical Corporation submitted to the USEPA a Notification of Hazardous Waste Activity ("Notification") for its operations at the Facility. In the Notification, Allied Chemical Corporation identified itself as a generator of hazardous wastes and an owner/operator of a hazardous waste treatment, storage, and/or disposal Facility. The USEPA assigned the Allied Chemical Corporation operations, which included the Facility, the USEPA Identification No. PAD990823742. On November 11, 1980, Allied Chemical Corporation submitted a RCRA Part A Hazardous Waste Permit Application ("Part A") to USEPA. In the Part A permit application, Allied Chemical Corporation indicated it generated, treated, stored, and disposed various hazardous wastes. On February 10, 1981, Allied Chemical Corporation submitted to the State of Delaware a Notification for its operations, which included the Delaware portions of the Facility. In the Notification, Allied Chemical Corporation identified itself as a generator of hazardous wastes and an owner/operator of a hazardous waste treatment, storage, and/or disposal Facility.

As a result of the May 21, 1986 transfer of the site to GCC, AlliedSignal submitted a Notification to the USEPA so that a Generator Identification Number specific to the remaining AlliedSignal facilities could be issued. On November 24, 1986, GCC submitted a revised Notification which stated that GCC was the owner of the Facility. The Notification was submitted on October 8, 1987. The USEPA assigned AlliedSignal the USEPA Identification No. PAD981739758. On May 9, 1990, GCC submitted to the USEPA a Notification for the Delaware portion of the Facility. The USEPA assigned the Delaware portion of the Facility USEPA Identification No. DED154576698.

The Facility currently holds a number of environmental permits (summarized in Table 1-2). Two of the permits are related to surface water discharge and consist of New Castle County (NCC) Wastewater Discharge Permit (WDP) WDP-92-080 and National Pollutant Discharge Elimination System (NPDES) No. DE 0000655 (State Permit WPCC 3218C/74). The NCC WDP allows a maximum flow of 1,000,000 gallons per day based on daily average discharges. A copy of the WDP and the NPDES permits are contained in Appendix B. The Facility also maintains air permits and other miscellaneous permits (e.g., dredging and materials license).

1.3 CFM

This section presents a general description of the environmental setting for the Facility in relation to COPIs and potential migration pathways and receptors. The CFM is based on existing information and will be refined, revised, and/or confirmed, if necessary, as information is collected during the RFI. However, this section provides sufficient information to support GCC's CFM that is the basis for the proposed scope of work (Chapter 4.0).

For the RFI Work Plan, GCC obtained documentation in accordance with USEPA's Office of Solid Waste and Emergency Response (OSWER) Directive No. 9355.7-04; Land Use in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remedy Selection Process to document reasonably anticipated future land use. This documentation included:

- Current land use
- Zoning laws
- Zoning maps
- Population growth patterns and projections
- Institutional controls currently in place

- Site location in relation to urban, residential, commercial, industrial, agricultural, and recreational areas
- Historic or recent development patterns
- Cultural factors (e.g., historic sites)
- Proximity of site to floodplain
- Geographic and geologic information
- Location of wellhead protection areas, recharge areas, and other areas identified in the State's Comprehensive Ground-Water Protection Program.

GCC contacted various county and state government offices as well as community offices to obtain applicable land use information. A summary of contacts is included in Table 1-3. A map presenting applicable land use information is included in Figure 4.

1.3.1 Environmental Setting and Surroundings

The Facility is situated on the Delaware/Pennsylvania state line about 15 miles south of Philadelphia and about 7 miles north of Wilmington. The Facility covers approximately 100 acres and is located within Claymont, Delaware and Marcus Hook, Pennsylvania on Philadelphia Pike (Route 13). With the exception of the far north corner, the entire South Plant is located in Delaware. Approximately two-thirds of the North Plant is located in Pennsylvania and one-third in Delaware. The Facility is located in a highly industrialized area that has witnessed heavy manufacturing, including both chemical and petrochemical, since the turn of the century.

1.3.2 Climate and Meteorology

Climate in the vicinity of the Facility is characterized as temperate coastal, moderated by the Appalachian Mountains to the west and the Atlantic Ocean to the east (National Oceanic and Atmospheric Administration, 1996). Climatological data was obtained from the National Climate Data Center in Asheville, North Carolina and the National Weather Service in Mt. Holly, New Jersey. Key climatological features are discussed below.

- Precipitation – Generally, precipitation is evenly distributed throughout much of the year. For the period from 1871 through 1999, annual precipitation ranged from 29.34 inches to 56.45 inches, with an average of 40.81 inches.

- Temperature – For the period from 1873 through 1999, the annual mean low and high temperature ranged from 45.6°F to 63.8°F, with an average of 54.6°F.
- Wind Velocity – Prevailing winds are from the southwest during warm months and from the northwest during cold months. For the period from 1940 through 1999, the average wind speed was 9.6 miles per hour. High-speed winds occur infrequently.

1.3.3 Topography and Surface Drainage

The topography of the Facility and surrounding area is fairly flat. The Facility is located on gently sloping terrain, including man-made fill areas, with elevations that vary from approximately 5 feet to 35 feet above mean sea level across most portions of the Facility. In general, the topography slopes across the Facility from a high point in the vicinity of the East and West Lagoons to the southeast toward the Delaware River. Surface water flows from topographic highs and discharges to the Delaware River.

1.3.4 Regional Geologic and Hydrogeologic Setting

The Facility is located within the Coastal Plain Physiographic Province which is characterized by low hills developed on unconsolidated sediments of Cretaceous, Tertiary, and Quaternary ages (Woodruff, 1975). The soils within the Coastal Plain are typically 2 to 3 feet in depth and are characterized by organic-rich soils developed from the underlying sediments. The soil profile grades from organic soils into unaltered parent sediments. Unconsolidated sediments consisting of gravels, sands, silts, and clays characterize the geology of the Coastal Plain. These sediments were deposited on the underlying Precambrian bedrock that consists of gneiss. The sediments tend to thicken to the east toward the Delaware River and continuing to the Atlantic Ocean. The Facility is located approximately 0.5 to 1 mile within the Fall Line.

Groundwater in the Coastal Plain is generally present in yields suitable for both domestic and industrial use, although groundwater is not utilized as a source of drinking water in the vicinity of the Facility (see Section 1.3.6). Groundwater typically occurs under water table conditions in the uppermost aquifer. At depth, interbedded sands and clays may create locally confined aquifer conditions bounded by less permeable aquitards. In the bedrock aquifer, groundwater is likely present under semiconfined and/or confined conditions. It is likely that the Delaware River System represents a discharge zone to the uppermost bedrock horizon and, therefore, there exists an upward hydraulic gradient between the bedrock zone and overlying alluvial materials. A hydrogeologic study conducted as part of an RFI performed at a PECO Energy Company facility located in Chester, Pennsylvania (about 1.5 miles north of the Facility) confirmed this finding when nested wells bordering the Delaware River demonstrated an upward

hydraulic gradient between the upper bedrock zone and overlying alluvial materials. It is anticipated that a similar groundwater flow regime would be encountered at the Facility since the depositional environment and resultant hydrogeologic characteristics are similar. Based on the proximity of the Delaware River, it is anticipated that groundwater in shallow water-bearing units in the vicinity of the Facility generally flows in a south-southeast direction towards the Delaware River. Naamans Creek, located about 1,200 feet south/southeast of the Facility, may also influence groundwater flow within the shallow water-bearing zone.

1.3.5 Facility Subsurface Conditions

Geologic and hydrogeologic conditions have been characterized within portions of the Facility through four separate soil and groundwater characterization studies conducted at several SWMUs and AOCs. These investigations have provided boring log and monitoring well data to assess subsurface conditions within these specific areas. These soil and groundwater investigations are as follows:

- From 1987-1989 Groundwater Technology, Inc. (Groundwater Technology) characterized subsurface conditions at the Former UST Area (SWMU 32) located within the westcentral portion of the South Plant.
- From 1989-1991 CH₂M Hill characterized subsurface conditions at the Acid Spill Area (AOC 2) located within the southern portion of the South Plant.
- From 1995-1997, Environmental Resources Management, Inc. (ERM) characterized subsurface conditions at the East and West Lagoons (SWMU 30) located within the northwestern portion of the North Plant.
- From 1995-1997, ERM characterized subsurface conditions at the Spent Acid Lagoon (SWMU 31) located at the northwestern portion of the South Plant.

Historical monitoring well locations installed as part of these investigations are presented in Figure 2. A total of 19 soil borings, which were later converted to groundwater monitoring wells, were installed within the four areas mentioned above. Only unconsolidated deposits (fill and alluvium) were encountered during these investigations. Total depths of the soil borings ranged from approximately 13 feet below ground surface (bgs) (EWL-8) at the northwestern portion of the North Plant (East and West Lagoons) to 54 feet bgs (B-2D and B-5D) at the southern end of the South Plant (Acid Spill Area). A summary of the previously installed groundwater monitoring wells and their current status is presented in Table 1-4. Boring logs and monitoring well details, where available, are contained in Appendix C.

1.3.5.1 Geologic Conditions

As discussed in Section 1.3.3, the Facility is situated adjacent to the Delaware River and is primarily underlain by river channel deposits. Based on available literature, two distinct stratigraphic units underlie the Facility – fluvially deposited sands, silts, and clays of the Delaware Bay Group and intrusive igneous rocks of the Wilmington Complex (Silurian period) which define the bedrock basement. In addition, a heterogeneous fill material covers much of the Facility. A schematic geologic cross section is presented in Figure 5. A description of these units and the fill are discussed in the following paragraphs.

Bedrock

Bedrock was not penetrated at any boring location at the Facility but was reportedly encountered at the total depths of five soil borings (MW-1, MW-2, MW-3, B-2D, and B-5D). Based on the boring log information, it is likely that bedrock was also encountered at Well EWL-5, installed immediately south of the East and West Lagoons (SWMU 30). Wells MW-1, MW-2, and MW-3 were installed within the westcentral portion of the South Plant at the Former UST Area (SWMU 32) and Wells B-2D and B-5D were installed within the southern portion of the South Plant in the vicinity of the Acid Spill Area (AOC 2). At Wells MW-1, MW-2, and MW-3, bedrock was reportedly encountered at depths ranging from 15.8 feet bgs (MW-1) to 22 feet bgs (MW-3). At Wells B-2D and B-5D, bedrock was encountered at approximately 54 feet bgs.

Alluvial Deposits

The complete thickness of the alluvial deposits was encountered at the Acid Spill Area (AOC 2) and the Former UST Area (SWMU 32). At the Acid Spill Area, located within the southern portion of the South Plant, alluvial deposits were completely penetrated at Soil Borings B-2D and B-5D. The thickness of the alluvial deposits was approximately 40 feet at both locations. At the Former UST Area, alluvial deposits were completely penetrated at Soil Borings MW-1, MW-2, and MW-3. The thickness of the alluvial deposits was approximately 15 to 22 feet within this area. At both locations the alluvial deposits consisted of alternating sequences of sand, silt, and clay layers, typical of a river channel depositional environment.

At the Spent Acid Lagoon and East and West Lagoon areas, nine soil borings were installed to total depths ranging from 13 feet bgs (EWL-8) to 24 feet bgs (SAL-1). With the exception of possibly EWL-5, these borings partially penetrated the alluvial deposits and primarily consisted of silts and sands.

Fill Material

Fill material was encountered in four soil borings within the Spent Acid Lagoon Area (SWMU 31) and seven soil borings from the Acid Spill Area (AOC 2). At the Spent Acid Lagoon Area, approximately 1 to 2 feet of concrete debris were encountered in each soil boring at depths ranging from 4 feet bgs (SAL-2) to 11.5 feet bgs (SAL-1). The remaining fill consisted of silts and sands. At the Acid Spill Area, fill material ranged from 9 to 15 feet in thickness and consisted of sands and silts with some slag, ash, and wood fragments.

1.3.5.2 Hydrogeologic Conditions

As mentioned previously, a total of 19 wells were installed historically in four distinct areas across the Facility to address specific environmental issues associated with those areas. Groundwater elevations were not obtained from each group of wells during the same time period and many of the wells are no longer in operation. However, data is available for each of the distinct areas which provide localized information regarding depth to water, groundwater flow direction, and other hydrogeologic characteristics of the uppermost water-bearing unit within each area. These hydrogeologic data are consistent with what is expected in this depositioned environment and hydraulic setting.

Groundwater Occurrence and Flow

Groundwater elevations, where available, are summarized in Table 1-5. Groundwater was encountered within the unconsolidated deposits (fill and alluvium) across the Facility. Seventeen of the 19 groundwater monitoring wells installed at the Facility were installed to straddle the water table. The water table was generally encountered between about 3 to 8 feet bgs across the Facility.

Wells MW-2D and MW-5D were installed to monitor the lower portion of the alluvium, immediately above bedrock, within the Acid Spill Area (AOC 2) adjacent to the Delaware River. The Acid Spill Area is the only location where the entire fill/alluvium water-bearing unit was penetrated. Based on the boring logs, the bottom 40 feet of the unit was saturated within the Acid Spill Area.

At three of the four distinct areas – East and West Lagoons (SWMU 30), Former UST Area (SWMU 32), and Acid Spill Area (AOC 2) – shallow groundwater generally flows southward toward the Delaware River. However, at the Spent Acid Lagoon (SWMU 31), shallow groundwater flow was to the east.

Rate of Groundwater Movement

In addition to depth to water and groundwater flow direction, other properties for the shallow groundwater zone were determined at two locations – the Former UST Area (SWMU 32) and the Acid Spill Area (AOC 2). Groundwater Technology and CH₂M Hill performed hydraulic conductivity testing in wells at the Former UST Area (SWMU 32) and the Acid Spill Area (AOC 2), respectively. The estimated hydraulic conductivity values for each area are summarized in Table 1-6. At the Former UST Area, estimated hydraulic conductivities ranged from 4.16×10^{-5} centimeters per second (cm/sec) to 4.02×10^{-4} cm/sec. Using these data, the average linear velocity of groundwater flow at the Former UST Area was estimated to be 1×10^{-2} to 8×10^{-5} feet per day.

At the Acid Spill Area, single-head aquifer tests were performed to determine the hydraulic conductivities of the fill materials and the two underlying sand units. Permeabilities of the interbedded silts and clays were determined using Shelby Tube samples. It was determined that the gravel fill yielded the highest hydraulic conductivities (2.0×10^{-2} to 1.4×10^{-1} cm/sec) and saturated silt and clay layers had the lowest hydraulic conductivities (7.5×10^{-6} to 7.2×10^{-7} cm/sec). Average linear velocities were also calculated for flow through the fill material. Groundwater average linear velocities at the Acid Spill Area ranged from 3.5 feet/day at high tide to 3.9 feet per day at low tide.

Tidal Influence

CH₂M Hill performed a tidal study at the Acid Spill Area (AOC 2) to determine the potential influence of tidal fluctuations from the Delaware River on the water table near the Delaware River. The tidal study indicated that the tidal fluctuations within the river had very little influence on the water levels, even within the wells closest to the river (B-2 through B-4).

1.3.6 Land and Water Use

This section discusses information regarding current and future land use for the purpose of determining the reasonably anticipated future land use for the subject Facility. This section will document that the future use of the subject Facility is anticipated to remain industrial. The information gathered for this section is based on the Land Use in the CERCLA Remedy Selection Process guidance document (USEPA OSWER Directive No. 9355.7-04). The scope of work for this task included a visual inspection of the site and its surrounding area; discussions with NCC's Department of Land Use officials, state officials, local community officials; and independent research.

1.3.6.1 Current Land Use

The subject Facility is located in a highly industrialized area. The Facility and surrounding properties have witnessed heavy manufacturing, including both chemical and petrochemical, since the turn of the century and it is expected that these properties will be utilized as industrial properties in the foreseeable future. The Facility and surrounding properties are in an area that is zoned as Heavy Industrial. The property is bounded to the north and northwest by Conrail lines; to the northeast by a refinery owned by Sun Oil Company; and to the west by a salt terminal owned by Oceanport Industries (formerly a petroleum products terminal). The Delaware River borders the Facility to the south. Property belonging to Honeywell is located in parcels in the east, central, and western area of the North Plant and in the south-southeast corner of the South Plant.

Figure 4 presents the local zoning information for the Facility and surrounding properties. The subject Facility is zoned as Heavy Industrial. This category includes construction, mining, manufacturing, transportation, and public utilities due to the land-use intensity and impacts typically associated with large industrial uses, their accessory outdoor storage uses, and large building areas (NCC, Delaware, Uniform Development Code, Chapter 40, Article 23, Section 40.23.270C., Industrial Uses). Adjoining properties to the east (Sun Oil Company) and west (Oceanport Industries, Inc.) are also zoned Heavy Industrial. The adjoining property to the north (Gilbert Subd) is zoned Industrial. The Delaware River bounds the Facility to the south. The closest property zoned for Residential use is located between one-eighth and one-quarter mile northwest of the subject Facility.

1.3.6.2 Historic Development Patterns

The subject Facility is located within the eastern corner of NCC designated Plat 101. According to Mr. Joseph M. Abele, Jr. (Planner, NCC Department of Land Use) the land in 101 has been platted since the 1920s and 1930s. Therefore, there exists no “free” land for development. Furthermore, the land use has remained consistent throughout this historic time period. Mr. Abele also stated that there are no plans to change any of the zoning designations that would affect the future use of the land in the area of the subject Facility.

1.3.6.3 Population Growth Patterns and Projections

As stated in Section 1.3.6.2, the subject Facility and the surrounding land have been built out since the 1920s and 1930s and the land use has remained consistent. Since there is no plan to change the future land use, it is anticipated that the population, both in number and in location, will remain relatively unchanged.

1.3.6.4 Cultural Factors

According to the NCC Unified Development Code, Appendix 4, there is one historically significant site within a 1-mile radius of the subject Facility. The site is identified as the Robinson House and is located about one-eighth mile west of the subject Facility. The Robinson House is owned by the State of Delaware and is a State Museum Property. According to Ms. Stephanie Bruning of the NCC Department of Land Use, the site is listed on the National Register of Historic Sites. (Note: the map received at the NCC Department of Land Use does not list it as a National Register Site.) The location of The Robinson House relative to the subject Facility is depicted in Figure 4.

According to personnel at the Delaware State Museum, The Robinson House is associated with the Robinson family who played a significant role in the Revolutionary War. The house has been present since the Revolutionary War. The site was purchased by the state of Delaware in 1967. It is currently leased to the Naamans Kill Chapter Questors, a women's group who conducts public events at the site (e.g., weddings, meetings, etc.).

1.3.6.5 Floodplain

A floodplain map for the subject Facility and vicinity obtained at the NCC Department of Land Use was reviewed. Since the site borders the Delaware River, portions of the subject Facility are incorporated within both the 500- and 100-year floodplains. Approximately 600 feet of the southern portion of the South Plant of the subject Facility is located within the 100-year floodplain. Approximately 900 feet of the southern portion of the South Plant of the subject Facility is located within the 500-year floodplain. The approximate boundaries of the 100- and 500-year floodplains are presented in Figure 4.

1.3.6.6 Wetlands

A wetlands map for the subject Facility and vicinity obtained at the NCC Department of Land Use was reviewed. According to the map, there are wetlands along the southern boundary of the Facility adjacent to the Delaware River. The wetlands are classified as E2FLN (Estuarine, Intertidal, Flat, and Regular). However, a visual inspection of the subject Facility and adjoining properties did not identify any vegetation characteristic of wetlands. (See Figure 4 for additional information.)

1.3.6.7 Groundwater Uses/Wellhead Protection

The Facility is located in the lower portion of Naamans Creek Watershed of the Piedmont Basin. The Naamans Creek Watershed comprises about 12,000 acres from northeastern Delaware into southeastern Pennsylvania. According to the DNREC sponsored report entitled, Piedmont Basin Preliminary

Assessment Report, water-yielding potential in the watershed is low and the only shallow public water supply well is found in the upper part of the basin, approximately 5 miles hydraulically upgradient (northwest) of the Facility.

The groundwater beneath the subject Facility is not used for potable purposes nor does it serve as a recharge area for groundwater or surface water that is used for potable purposes. According to Delaware State Geologist, Ms. Stephanie Baxter of the Delaware Geological Survey, without localized pumping influence, groundwater within the unconsolidated zone and uppermost bedrock discharges to the Delaware River southeast of the Facility. DNREC's Water Supply Division was requested to perform a database review of existing wells within a 2-mile radius of the Facility. The well search did not identify any wells used for potable purposes within a 2-mile radius of the Facility. A total of 10 wells were identified within a 2-mile radius (in Delaware) of the Facility. The use of all of the wells was identified as either "monitoring" or "observation." Research of wells located in Pennsylvania is ongoing and will be performed as a task under the RFI Work Plan.

A Water Resource Protection Area (WRPA) map (1993, revised May 2001) developed by the Delaware Water Resource Agency was reviewed. According to the map, the closest wellhead WRPA is located over 3 miles west of the facility. This well is located hydraulically upgradient of the subject facility. The closest surface water WRPA is located approximately 6 miles southwest of the Facility

The potential for groundwater beneath the Facility to be used for potable purposes now or in the future is remote. The Facility is situated in a Public Water Supply Systems Service Area. United Water of Delaware services the area. United Water of Delaware obtains the majority of their potable water from surface water intakes on White Clay Creek in northwestern Delaware. They also purchase water from a Pennsylvania Water Company that obtains their water from the Susquehanna River Basin. According to the Delaware Division of Water Resources, where an approved public water supply system is legally and reasonably available to the site to be served, the Department shall deny an application for a well permit for a potable water well. A public water supply system is deemed available when a Certificate of Public Convenience and Necessity has been granted. This would indicate a well is not permitted to be installed for potable purposes within Public Water Supply Service Areas, which protects the future use of groundwater beneath the facility and surrounding area. According to Mr. Jerry Kauffman, Water Resources Engineer at the Delaware Water Resources Agency, there is no plan to use the groundwater beneath the facility, or in the general vicinity of the facility, for potable purposes. Groundwater beneath the facility would not affect any wellhead protection areas or surface water intakes currently used for

potable purposes, and groundwater beneath the facility does not function as a recharge area for potable sources of groundwater.

Past industrial operations in the area have resulted in a regional impact to groundwater quality within this area. According to the DNREC-sponsored report entitled, Piedmont Basin Preliminary Assessment Report, 27 Facilities within the Naamans Creek watershed area are known to or may have potentially impacted groundwater. In addition, another 33 Facilities are listed as hazardous waste generators. Common contaminants associated with these sources or potential sources include volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, and dissolved metals. One Facility in the area has recently identified both light and dense nonaqueous phase liquid plumes in the unconfined aquifer.

A sensitive receptor study was performed by Groundwater Technology (December 13, 1989) as part of the closure activities for the USTs located at the Former UST Area (SWMU 32). According to this study, the Facility has a surface water intake from the Delaware River. The next closest surface water intake is at the Dupont-Edgemoor Facility, which is located approximately 5 miles downstream. These surface water intakes are only used for industrial purposes (e.g., cooling waters).

1.3.7 Fate and Transport

This section contains a general discussion on the various physical and chemical properties, potential mobility, and persistence of COPIs detected during past investigations at the Facility that could potentially determine the fate and transport of chemical constituents in the environment. Several of these constituents have recently been summarized in the IAO as well as in the EI Evaluation conducted for the Facility (Earth Sciences Consultants, Inc., 1999). A copy of the EI Evaluation is contained in Appendix D. The chemical/physical properties, as well as the mobility and persistence of the constituents are summarized in Section 1.3.7.1. These chemical-specific properties, in conjunction with physical/chemical features of the environmental media in which they reside, provide a basis of understanding the significance of potential migration pathways. Those environmental migration pathways that are considered as being potentially significant are presented in Section 1.3.7.2. Potential human and ecological receptors associated with the migration pathways are summarized in Sections 1.3.7.3 and 1.3.7.4, respectively. Section 1.3.7.5 presents a brief summary of the CFM.

1.3.7.1 Chemical and Physical Properties

The potential for a constituent to migrate and persist in environmental media is an important factor in evaluating risk to human health and the environment. The environmental mobility of a chemical is influenced by its physical and chemical properties, the physical characteristics of the Facility, and the Facility chemistry. This section evaluates the properties of the types of constituents detected at the Facility with emphasis on potential environmental mobility and persistence.

Migration of organic contaminants through soil and groundwater is influenced by chemical and physical reactions between the constituents, groundwater, and the solid media through which it migrates. These properties include:

- Specific gravity
- Vapor pressure
- Water solubility
- Octanol/water partition coefficient (K_{ow})
- Bioconcentration factor
- Soil/sediment adsorption coefficient (K_{oc})
- Henry's Law constant
- Mobility index

The results of previous investigations or description of materials in SWMUs/AOCs at the Facility have indicated the presence of organic compounds including VOCs (e.g., benzene, chlorobenzene, and trichloroethene [TCE]), SVOCs (e.g., 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, and pentachlorophenol), pesticides (lindane and 4,4'-DDT), herbicides, and polychlorinated biphenyls (PCBs). Several inorganic constituents are also identified. The following sections present fate and transport information on the general classes of organic compounds and general inorganic mobility information.

VOCs

Several VOCs (e.g., benzene, chlorobenzene, and TCE) have been detected in groundwater at the Facility. VOCs tend to have a low residence time in surface soil environments, and may be persistent in groundwater. However, nonchlorinated monocyclic aromatic VOCs, such as benzene, may undergo rapid biodegradation in the vadose zone, before migrating to groundwater. The chemical/physical properties of the nonhalogenated compounds indicate that they are more mobile in the environment than are the halogenated compounds.

SVOCs

Several SVOCs have been detected in soil and groundwater at the Facility. SVOCs have a longer residence time in soil than VOCs as they have a high affinity to organic materials in soil, as exhibited by their high K_{oc} and K_{ow} values. Higher K_{ow} values also indicate that bioaccumulation is a more significant fate process than previously described for VOCs. Generally, SVOCs are characterized by low vapor pressures and water solubilities, thereby limiting or precluding volatilization and leaching from soil and migration into groundwater. The mobility indices calculated for specific SVOCs found at the Facility such as PCP and 1,4-dichlorobenzene indicate that these compounds are immobile or are slightly mobile in the environment. Higher chlorinated benzenes are less mobile than are the mono- or dichlorinated benzenes.

Pesticides

Several organo-chlorine pesticides have been detected in soil and groundwater in portions of the Facility. Generally, pesticides are very persistent in the environment. Sorption to soil/sediment particulates and bioaccumulation are important transport processes. Volatilization from soil and water is probably the most important transport process for DDT, as evidenced by the ubiquitous nature of this compound in the environment. Volatilization is somewhat of an important transport process for the benzene hexachloride (BHC) compounds in the aquatic environment and is considered a major transport process in soils. In aqueous systems, sorption to anaerobic sediments and subsequent biodegradation by anaerobic organisms is a primary transport and fate process for the BHC compounds. Biodegradation of the BHC's yields such chemicals as pentachlorocyclohexane, tetrachlorobenzene, and trichlorophenol and, therefore, may not result in substantial detoxification of the original compound. Lindane has been shown to be persistent in soil, with observations indicating up to 10 percent of the original concentration remaining after 10 years. Although it occurs slowly, the ultimate fate process for the DDT, DDD, and DDE compounds, is biotransformation to form bis(2-chlorophenyl)methanone. Direct and indirect photolysis are also important fate processes for DDT and DDE, respectively, in the aquatic environment.

PCBs

PCBs were detected in a groundwater sample collected at one location at low concentrations adjacent to the East and West Lagoons (SWMU 30). As a class of compounds, PCBs are relatively inert and, therefore, persistent in the environment. The chemical/physical characteristics can generally be described by low vapor pressures, low water solubility, and high log octanol/water partition coefficients. Despite low vapor pressures, they have a high activity coefficient in water, which causes a higher rate of volatilization than might normally be expected. Adsorption to organic material in soil and sediment is the

predominant fate of PCBs in the environment. As a result of their relative chemical inertness, PCBs adsorbed onto soil and sediment tend to persist for years, with desorption occurring very slowly over time, thereby creating continuous low-level exposures to the surrounding media. Bioaccumulation of PCBs also occurs, with most of the compound being stored in the adipose tissues of animals and/or humans. The lesser-chlorinated compounds (i.e., PCBs with less than five chlorine atoms) can be biodegraded by some microorganisms in soil. Photolysis by ultraviolet light is an important fate process in the degradation of the more persistent higher chlorinated PCBs. However, this process is extremely slow.

Herbicides

Three herbicide compounds (2,4,5-T, silvex, and 2,4-D) were detected in groundwater samples collected from the Facility. Herbicides generally exhibit low vapor pressures; therefore, volatilization is not a significant environmental transport process. Water solubilities for these compounds vary proportionally with molecular weight, from not very soluble (silvex) to moderately soluble (2,4,5-T) to highly soluble (2,4-D). Generally, both adsorption to soil and sediments, photodegradation, and biodegradation may be important fate processes for herbicides. Neither photodegradation nor biodegradation occur very quickly.

Inorganics

Numerous factors have been suggested as influencing mobility of elements in soils. Among these are: physical factors of the soil (structure and texture); biological factors (aerobic and anaerobic microbial activities); and chemical factors (pH, redox potential, cation exchange capacity). Under appropriate conditions, any of these factors can become dominant and exert controlling influences on inorganic mobility. In general, the following will usually be the most significant factors affecting inorganic constituent mobility:

- Particle size distribution (soil texture)
- Porosity (soil structure)
- pH
- Redox Potential
- Cation Exchange Capacity
- Soil organic matter

1.3.7.2 Potential Migration Pathways

Potential environmental migration pathways of constituents that may exist at the Facility are likely to be limited to soil and groundwater, although the potential may exist for groundwater migration and the

subsequent diffuse discharge to the Delaware River. The existence of this pathway will be determined during implementation of the RFI Work Plan.

This section contains general, Facility-wide information regarding the potential migration of constituents from various points of release across the Facility. It should be noted that actual transport and fate mechanisms at the Facility may vary with variable surface and subsurface features across the Facility, as well as the types of constituents (e.g., organic versus inorganic) that may be present. Therefore, refined descriptions of Facility-specific migration pathways will be provided, as necessary, in the RFI Report as sufficient relevant data become available. Based on the evaluation of existing conditions at the Facility, the following is a preliminary list of potential transport pathways that will be evaluated during the RFI:

- Leaching of soil constituents to groundwater
- On-Facility and off-Facility atmospheric deposition of windblown dust
- Surface soil runoff
- Migration of constituents in groundwater

As previously discussed in Section 1.3.7.1, constituents released to the environment may undergo the following fate processes during transportation:

- Physical transformations: volatilization, precipitation
- Chemical transformations: photolysis, hydrolysis, oxidation, reduction
- Biological transformation: biodegradation
- Accumulation in one or more media

As data and information become available during the RFI, the above-presented list of pathways and mechanisms are subject to deletion or modification, or pathways may be added.

1.3.7.3 Potential Human Receptors

The Facility is located in a highly industrialized area. The land use for the last 100 years in the area has been industrial and will remain industrial for the foreseeable future. Fencing controls access to the Facility at all boundaries, including along the Delaware River, and security personnel are present on-Facility 24 hours a day.

Based on this land use profile, potential current and future human receptors to soil contamination at the Facility are limited to the industrial worker. Potential exposure pathways to the current and future industrial workers are dermal contact or ingestion of surficial soils. Inhalation of fugitive dusts is not

likely to be a concern since most or all of the Facility is paved or covered with gravel. Additionally, the inhalation of constituents that may be volatilizing from the subsurface is not a significant pathway, as indicated by the results of routine employee monitorings that are retained on file by GCC. The presence of these surfaces also acts as a barrier to ingestion and dermal exposure pathways as well. The RFI scope of work is designed to characterize these potential pathways, based on the analytical data obtained, and, if necessary, design a remedy to mitigate or control them. In addition to industrial workers, other possible receptors to constituents in soil may be construction workers, especially while performing excavation activities in these areas. However, should construction occur in the future, worker safety will be protected by the development and implementation of a Construction Management Plan which will indicate the adequacy of the plant's personal protective equipment requirements for subsurface excavation activities. Additionally, institutional controls will be implemented, as necessary, to protect this population if GCC is no longer in control of the site. Therefore, the construction worker pathway under these scenarios is not complete and will not be addressed further.

Groundwater beneath the Facility does not pose a risk to human health because there is no complete pathway. As indicated in Section 1.3.6, groundwater within and in the vicinity of the Facility is not a current or planned source of drinking water and, therefore, is not a reasonable potential future use.

Groundwater from the Facility discharges into the Delaware River, which is used for some recreational activities (e.g., boating, water skiing, swimming, etc.). However, even if concentrations of COPIs would be in excess of applicable standards in groundwater beneath the Facility, groundwater discharge to the river is still not likely to pose a risk to human health, due to the significant dilution that would result from subsequent mixing. Nevertheless, this potential pathway will be evaluated during the RFI. Groundwater may also flow off site to the west. GCC will investigate this possibility during the implementation of the RFI Work Plan. Based upon 1) the distance between GCC's property and Naamans Creek; 2) the fact that other entities own and operate industrial operations on properties that separate GCC and Naamans Creek; and 3) numerous other possible influences on Naamans Creek from upstream sources, GCC believes that it has no obligation to evaluate potential impacts to Naamans Creek. Thus, GCC believes that possible impacts on Naamans Creek via groundwater should be investigated, if at all, by Honeywell or owners of property adjacent to the creek. On-site groundwater data will be used to determine whether constituents of concern are migrating off site at acceptable levels.

Presently, on-Facility surface water/sediment exposures do not occur, nor are they expected to occur in the future. On-Facility surface waters exist primarily as storm water runoff that is discharged to the river

through the NPDES outfall. All such discharges are required to meet NPDES outfall limits. These surface waters are not used for irrigation purposes, nor do they contain edible organisms; therefore, there are no complete food pathways. No sediment exposures occur since there are no sediments present on the Facility.

1.3.7.4 Potential Ecological Receptors

There are no on-Facility ecological receptors at the Facility because there is no acceptable habitat (see Photographs in Appendix E). The only off-Facility receptor is the Delaware River, which borders the Facility to the south. Groundwater will be evaluated during the RFI at the southern property boundary to determine the potential impact on ecological receptors in the Delaware River, if any. Based upon 1) the distance between GCC's property and Naamans Creek; 2) the fact that other entities own and operate industrial operations on properties that separate GCC and Naamans Creek; and 3) numerous other possible influences on Naamans Creek from upstream sources, GCC believes that it has no obligation to evaluate potential impacts to Naamans Creek. Thus, GCC believes that possible impacts on Naamans Creek via groundwater should be investigated, if at all, by Honeywell or owners of property adjacent to the creek. On-site groundwater data will be used to determine whether constituents of concern are migrating off site at acceptable levels.

1.3.7.5 CFM Summary

A preliminary CFM has been developed for the Facility that summarizes the information previously discussed regarding COPIs and possible environmental migration pathways, as well as potential human/ecological receptors and associated exposure pathways. The CFM presents this information under both current and expected future land use scenarios. This CFM is substantiated by the results of an EI Evaluation that was performed in accordance with the RCRA Cleanup Reforms Act (see Appendix D). The model will be refined as additional Facility-wide groundwater data, as well as soil data for specific SWMUs/AOCs, become available during implementation of the RFI Work Plan.

1.4 DOCC – SWMUs/AOCs

This section summarizes the historical use, description, and current status of SWMUs and AOCs identified for the Facility taken from the SWMU descriptions compiled in the 1986 RFA report and current observations. The locations of the 23 SWMUs and four AOCs to be evaluated as part of this RFI Work Plan are presented in Figures 2 and 3. A summary of the historical uses, physical description, and current status of the SWMUs and AOCs is presented in Table 1-1. Photographs of the SWMUs and

AOCs are contained in Appendix E. The following sections present a brief summary of the SWMUs and AOCs.

1.4.1 SWMU 1 – Phosphoric Acid Storage Pond (North Pond)

The former Phosphoric Acid Storage Pond (North Pond) was located in the southeastern portion of the South Plant. The North Pond was constructed in about 1960 and was in use until about 1984. From about 1960 until 1971 it was used to store phosphoric acid. From 1972 to 1984, it was included as part of the effluent treatment system and regulated under the NPDES permit. It served as a basin for the collection of sodium hydroxide process wastewater from the fluorosulfonic acid scrubber, storm water run-off from the aluminum sulfate area, and tank car/truck washings. The North Pond was removed from the NPDES effluent system in July 1985 and has not been used since then. Reportedly, the North Pond received wastes from only acid-based processes.

The unit had an outside dimension of 94 feet by 104 feet and an inside dimension of approximately 50 feet by 60 feet. The walls of the unit were approximately 6 feet high. The unit had a capacity of approximately 1,000 tons of liquid. The unit was constructed of compacted clay soil lined with burlap followed by a layer of asphalt, then another layer of burlap, and another layer of asphalt and then a final layer of burlap. The asphalt was protected by two coats of road oil and chipped rock. The North Pond was closed by backfilling with clean fill. Currently, the former North Pond is covered with gravel. There are no documented releases associated with the former North Pond.

1.4.2 SWMU 2 – Phosphoric Acid Storage Pond (South Pond)

The former Phosphoric Acid Storage Pond (South Pond) was located in the southeastern portion of the South Plant. The South Pond was constructed in about 1960 and was in use until about 1970. It functioned as a phosphoric acid storage unit. Wastes accumulated included iron phosphate and muds. The wastes were periodically removed and taken off Facility for disposal.

The unit had an outside dimension of 74 feet by 134 feet and an inside dimension of approximately 30 feet by 91 feet. The walls of the unit were approximately 6 feet high. The unit had a capacity of approximately 900 tons of liquid. The unit was constructed of compacted clay soil lined with burlap followed by a layer of asphalt, then another layer of burlap, and another layer of asphalt and then a final layer of burlap. The asphalt was protected by two coats of road oil and chipped rock. The South Pond was closed in 1971 and backfilled with clean fill in preparation for construction of the South Waste Treatment Plant (SWMU 26). Currently, two ASTs (SWMUs 7 and 8) are located on top of the former

pond location and the remaining areal extent of the pond is covered with asphalt. There are no documented releases associated with the former South Pond.

1.4.3 SWMU 3 – Red Mud Slurry Pond A

The former Red Mud Slurry Pond A is located in the west central portion of the South Plant (Figure 2). The Red Mud Slurry Pond A was constructed in about 1965 and was in use until about 1971. It functioned to store iron oxide that originated from the burning of pyrite ores. Liquids accumulating on the surface of the pond were drained off to the sluiceway. The slurry pond was backfilled in 1974 and the drainage operations to the sluiceway ceased. The sluiceway remains in operation. It discharges only noncontact cooling water and storm water to the Delaware River under NPDES permit.

The unit had dimensions of approximately 30 feet by 100 feet and was approximately 5.5 feet deep. The unit had a capacity of approximately 120,000 gallons. The unit was constructed of compacted soil and was lined on one end with railroad ties to form a continuous bulkhead. The pond was closed in 1974 by removing remaining slurry and disposing it off Facility and subsequently backfilling it with clean fill. Currently, the Red Mud Slurry Pond A, with the possible exception of the far western end, is covered with asphalt. There are no documented releases associated with the former Red Mud Slurry Pond A.

1.4.4 SWMU 4 – Red Mud Slurry Pond B

The former Red Mud Slurry Pond B is located in the west central portion of the South Plant adjacent to the Red Mud Slurry Pond A (SWMU 3). The Red Mud Slurry Pond B was constructed in about 1965 and was in use until about 1971. It functioned to store iron oxide that originated from the burning of pyrite ores. Liquids accumulating on the surface of the pond were drained off to the sluiceway. The slurry pond was backfilled in 1974 and the drainage operations to the sluiceway ceased. The sluiceway remains in operation. It discharges only noncontact cooling water and storm water to the Delaware River under NPDES permit.

The unit had dimensions of approximately 30 feet by 100 feet and was approximately 5.5 feet deep. The unit had a capacity of approximately 120,000 gallons. The unit was constructed of compacted soil and was lined on one end with railroad ties to form a continuous bulkhead. The pond was closed in 1974 by backfilling it with clean fill. Currently, the Red Mud Slurry Pond B is covered with asphalt. There are no documented releases associated with the former Red Mud Slurry Pond B.

1.4.5 SWMU 5 – Spar Building Storage Area

The former Spar Building Storage Area is located at the southeastern portion of the South Plant. The Spar Building Storage Area was used to store miscellaneous plant wastes, construction materials, and nonhazardous off-grade product primarily in drums. Specific plant wastes stored included hypo muds, carbon and sand residues, waste oil and lubricants, sulfuric acid sludges, and resin beads. Most of these materials were stored in 55-gallon drums. The storage area had a capacity to store up to 500 55-gallon drums. At the time of the RFA in 1986, there were approximately 300 55-gallon drums of waste in the storage area. The Spar Building Storage Area is no longer in use. In 1989, approximately 300 55-gallon drums were removed and disposed via incineration and landfilled off site.

The storage area has dimensions of approximately 100 feet by 130 feet. The storage area had an asphalt base and fenced sides while it was in use. After the stored drums were removed, plant debris (construction debris, gravel, etc.) stored in the area was spread over the area and the entire Spar Building Storage Area was covered with gravel. There are no documented releases associated with the Spar Building Storage Area.

1.4.6 SWMU 6 – Drum Storage, South Treatment Plant

The Drum Storage, South Treatment Plant is located at the southern portion of the South Plant. The Drum Storage, South Treatment Plant was used to store off-grade nonhazardous sodium sulfite/sodium sulfate product. The storage area had a capacity to store up to 700 55-gallon drums. The Drum Storage, South Treatment Plant was in operation from 1980 to 1989. The storage area had dimensions of approximately 5,250 square feet. The RFA indicates the entire area was paved with concrete or asphalt. The RFA does not indicate, and GCC cannot confirm, whether the storage area was paved during its entire period of use. During a site walk in February 2002, the pavement in two areas was observed to be highly deteriorated. The concrete portion measures approximately 28 feet by 25 feet and the asphalt portion measures approximately 70 feet by 65 feet. There are no documented releases associated with the Drum Storage, South Treatment Plant. In 1989, approximately 600 55-gallon drums of material were removed and sent to an off-site landfill. There were no drums or other material storage units observed at the SWMU during the February 2002 site walk.

1.4.7 SWMU 7 – Effluent Clarifier Tank

The Effluent Clarifier Tank is an AST and is located in the southern portion of the South Plant. The Effluent Clarifier Tank was installed in 1972. From 1972 to 1982, it was used to receive treated process water from the South Waste Treatment Plant neutralizer. From 1982 to 1990, it was used as a waste

effluent clarifier, primarily accepting inorganic acids from the washing of tank cars and trucks. It is not currently used. The waste effluent was managed under the Facility's NPDES permit. The tank is constructed of steel and rests on a concrete foundation. The ground surface around the tank is covered with asphalt. The tank measures 30 feet in diameter and is 13 feet high and has a capacity of approximately 65,000 gallons. There are no documented releases associated with the Effluent Clarifier Tank.

1.4.8 SWMU 8 – Effluent Clarifier Tank

A second, smaller Effluent Clarifier Tank is located at the southern portion of the South Plant. The tank is constructed of steel with a rubber lining and concrete base. The smaller Effluent Clarifier Tank was installed in 1972. From 1972 to 1982, it was used to settle alum muds and from 1985 to the present it has been used for the storage of sulfate material from the process. The ground surface adjacent to the tank is covered with asphalt. The tank measures 25 feet in diameter and is 10 feet high and has a capacity of approximately 35,000 gallons. There are no documented releases associated with the smaller Effluent Clarifier Tank.

1.4.9 SWMU 10 – South Waste Treatment Storage Pad

The South Waste Treatment Storage Pad is located on the southern portion of the South Plant. The South Waste Treatment Storage Pad was constructed in 1982. It is currently used for the storage of nonhazardous waste muds. Prior to 1982, the phosphoric acid plant was located within this area. Typically, lined dumpsters are placed on the storage pad and nonhazardous wastes are placed in the dumpsters. Once full, the nonhazardous wastes are disposed off Facility. The storage area is thought to be covered with concrete. A gravel layer has been placed over top of the concrete. The storage area measures about 130 feet by 100 feet. There are no documented releases associated with the South Waste Treatment Storage Pad.

1.4.10 SWMU 11 – Waste Oil AST

The Waste Oil AST is located within the powerhouse in the central portion of the South Plant. The 1,500-gallon aboveground tank is constructed of fiberglass and is located above a concrete floor and has secondary containment. The tank was installed in 1983. It is used to store waste oil generated during operations. Approximately 2,500 gallons of waste oil is managed per month. There are no documented releases associated with the Waste Oil AST.

1.4.11 SWMU 12 – Waste Oil UST

The former Waste Oil UST was located outside the garage in the northwestern portion of the South Plant. The 1,000-gallon UST was constructed of steel. The UST was out of service from 1980 to 1987 and was removed in 1989. The area is currently paved with concrete. There are no documented releases associated with the tank.

1.4.12 SWMU 16 – Past Landfill–Area IV

The Past Landfill–Area IV is located in the north portion of the North Plant. The Past Landfill–Area IV was in use from approximately 1972 to 1977. During this time, the landfill reportedly was used to dispose of waste solvents generated during packaging operations (i.e., spills, packaging, cleaning, equipment cleanings, etc.). Specific chemicals reportedly disposed in the landfill include acetone, methanol, methyl isobutyl ketone, isopropyl alcohol, tetrachloroethene (PCE), toluene, TCE, xylene, dichloro-trichloro-ethane, isohexane, nitromethane, cyclopentane, isopropylamine, dodecylbenzene, sulfonate, ethyl alcohol, hexane, and methylene chloride. It is estimated that a total of 75 tons of wastes were disposed in the landfill.

The landfill consisted of two “excavations”, each measuring approximately 10 feet long, 8 feet wide, and 6 feet deep. These measurements resulted in a capacity of approximately 36 cubic yards. The area was reportedly backfilled and topped with crushed stone.

1.4.13 SWMU 21 – Past Landfill–Area IX

The Past Landfill–Area IX is located in the northwestern portion of the North Plant, north of the East and West Lagoons (SWMU 30). The Past Landfill–Area IX was used in 1960, reportedly for the disposal of approximately 400 tons of lindane and other pesticide residue wastes. Specific chemicals disposed in the landfill included alpha, beta, and gamma benzene hexachloride; lindane; and DDT.

The landfill consisted of two rectangular excavations, each measuring approximately 200 feet long, 9 feet wide, and 6 feet deep. The capacity totaled approximately 800 cubic yards. The area was backfilled in 1960, following waste disposal. A portion of the landfill (southernmost) was located under the northern portion of the East and West Lagoons (SWMU 30), which were constructed in 1972. In 1978, the portion of the landfill not located beneath the lagoons was covered with asphalt. Currently, the area is partially covered with gravel (former location of the East and West Lagoons [SWMU 30]) and partially covered with asphalt.

1.4.14 SWMU 22 – Past Landfill–Area X

The Past Landfill–Area X is located at the northwestern portion of the North Plant just south of the former East and West Lagoons (SWMU 30). The Past Landfill–Area X was in use from 1958 to 1959. Pyrite ore, which contained selenium ore as an impurity, was burned at the South Plant. The selenium was removed during burning using cellulose filter material. The selenium contained on the filter material was extracted with a dilute alkali solution. Following the selenium recovery process, the remaining filter material was placed in the landfill. Approximately 475 tons of material were placed in the landfill. The landfill consisted of a rectangular excavation measuring approximately 200 feet long, 50 feet wide, and 10 feet deep. The capacity totaled approximately 3,700 cubic yards. (The RFA reports it to be 500 feet wide; however, based on the amount of material placed in the landfill, interviews with Facility personnel, and a Facility inspection, a width of 50 feet is more realistic.) The area was backfilled in 1959. Currently, the area is covered with gravel.

1.4.15 SWMU 23 – Past Landfill–Area XI

The Past Landfill–Area XI is located at the southeastern portion of the North Plant. The Past Landfill–Area XI was in use from approximately 1945 to 1974 and was reportedly used for disposal of laboratory samples. Specific chemicals reportedly placed in the landfill included acids (sulfuric, nitric, hydrochloric, hydrofluoric, fluorosulfonic, phosphoric), kepone, BHC, DDT, various inorganic salts, and various halogenated and nonhalogenated solvents. According to GCC personnel, there was no known use of PCBs associated with the laboratory processes. Approximately 0.5 ton of material was reportedly disposed in the landfill.

The landfill consisted of an excavation measuring approximately 10 feet long, 4 feet wide, and 1 foot deep. The capacity totaled approximately 1.5 cubic yards. The area was backfilled in 1974. In 1978, the area was reportedly covered with asphalt and properly sloped to prevent storm water penetration. Currently, the surface area is covered with gravel.

1.4.16 SWMU 24 – RCRA Storage Area

The RCRA Storage Area is located at the northeastern portion of the North Plant. The RCRA Storage Area has been in use since approximately 1968. From 1968 to 1972, it was used for the packaging and storage of perchloric acid. From 1983 to 1985, it was used as a hazardous waste storage facility (USEPA ID No. 990823742) and from 1985 to the present it was used to stage hazardous wastes for less than 90 days. Hazardous wastes stored at the RCRA Storage Area consisted primarily of D001, D002, and F002 waste types. Specific wastes managed by the RCRA Storage Area included BNSA “muds” (e.g.,

naphthalene, naphthalene sulfonic acid, cellulose fiber), organic strippers (e.g., PCE, dichlorobenzene, phenol), methylene chloride wastes, solvent wastes, and oximino silane wastes (hexane, ammonium chloride). At the time of the RFA, typically the RCRA Storage Area managed between 7 to 120 containers (55-gallon drums or 44-gallon fiberpaks) of material.

The RCRA Storage Area has a total area of approximately 4,810 square feet and is subdivided into three areas. Section A measures approximately 2,200 square feet and is an open area with a concrete and asphalt base and curbed sides. Section B measures approximately 1,890 square feet and is fully enclosed with a concrete base and curbed sides. Section C measures approximately 720 square feet and is fully enclosed and has curbed sides and a base constructed of concrete. The RCRA Storage Area has a capacity to manage up to 400 containers (55-gallon drums or 44-gallon fiberpaks) of material.

AlliedSignal submitted a closure plan to the then Pennsylvania Department of Environmental Resources (DER) (now the Pennsylvania Department of Environmental Protection [DEP]) on August 15, 1983 for the RCRA Storage Area. The DER issued a closure inspection report dated December 31, 1985 for the RCRA Storage Area. Following closure, materials were no longer stored for over 90 days at the unit. There are no documented releases associated with the RCRA Storage Area.

1.4.17 SWMU 25 – Sulfuric/Oxalic Storage Tanks

The former Sulfuric/Oxalic Storage Tanks were two aboveground tanks located within the southcentral portion of the North Plant. The former Sulfuric/Oxalic Storage Tanks were installed in early 1967 and used until 1988. They were removed in the 1990s. The tanks were used to store nonhazardous spent sulfuric acid and oxalics. At the time of the RFA in 1986, the tanks stored approximately 20,000 gallons of material.

The SWMU consisted of two tanks that were each 13 feet in diameter and 12 feet in height (capacity of approximately 12,000 gallons each). They were constructed of steel and were lined with lead-plated brick. The area where the tanks used to be located is now paved with asphalt. There are no documented releases associated with the tanks.

1.4.18 SWMU 26 – South Waste Treatment Plant

The South Waste Treatment Plant is located in the southern portion of the South Plant. The main portion of the plant was a two-story steel building measuring approximately 100 feet in length and 26 feet wide. The plant also included associated tanks listed separately as effluent clarifiers (SWMUs 7 and 8). The

plant is no longer in operation. The area where the plant was located is now completely covered with asphalt or concrete. There are no documented releases associated with the South Waste Treatment Plant. The plant was constructed in 1972 and the main steel building was demolished in 1982.

The plant was used to neutralize and reduce solids loading in effluent streams primarily from the alum, hydrofluoric acid, fluoride, and sulfuric acid manufacturing processes. Solid waste generated from this operation was primarily a dewatered sludge consisting of gypsum and was placed in the solid waste impoundment (SWMU 9) located immediately east of the plant on AlliedSignal property. Approximately 87,000 tons of sludge were placed in the solid waste impoundment during the 10 years the plant operated. The treated effluent was discharged under the Facility's NPDES permit.

1.4.19 SWMU 27 – EPS–North

The EPS–North is located at the northwestern portion of the North Plant. The plant currently consists of the following components:

- two in-ground storage tanks (12 feet in diameter and 21 feet in depth)
- three neutralizers (12 feet in diameter and 17 feet in height)
- two clarifiers (25 feet in diameter and 13 feet in height)
- two lime storage units (12 feet in diameter and 18 feet in height)
- three sludge containers (22 feet in length, 7 feet in width, and 4 feet in height)

The system has a capacity of processing up to 1,500,000 gallons per day of wastewater.

Beginning in 1972, the EPS–North processed sanitary wastewaters that were associated with North Plant operations. A process wastewater flow chart is contained in Appendix F. Process wastewater entering the system is collected in the two in-ground storage tanks. (From 1972 to 1997, wastewater was stored in lined basins designated the East and West Lagoons [SWMU 30] prior to entering the treatment facility. As discussed in Section 1.4.21, these lagoons have since been closed.) From the wet wells, process wastewater is introduced in a controlled manner to the neutralizers where calcium hydroxide is added primarily for pH control and fluoride precipitation. Materials within the neutralizers are then conveyed to clarifiers, where precipitates are settled out. The overflow from the clarifiers is discharged to NCC's Publicly Owned Treatment Works (POTW) and the clarifier bottoms are sent to a filter press for solids removal. Filtrate from the filter press is returned to the clarifiers and the solids are collected and sent off Facility for disposal. The solids are nonhazardous and are essentially calcium fluoride, with trace metals.

Typically, approximately 75,000 pounds of solid waste were generated each month. There are no documented releases associated with the EPS-North.

1.4.20 SWMU 28 – Hypo Muds Accumulation

Hypo muds (ammonium thiosulfate) are accumulated in a lined dumpster at two locations on the northeastern portion of the South Plant. Hypo muds have been accumulated in dumpsters since 1973. The waste is generated by wastewaters from photo-salt manufacturing processes being oxidized and the suspended solids are removed by vacuum filtration. Typically, approximately 12,000 pounds of hypo muds are accumulated each month and disposed off Facility. The capacity of the dumpster is 20 cubic yards. There are no documented releases associated with the hypo muds or their management.

1.4.21 SWMU 30 – East and West Lagoons

The former East and West Lagoons are located in the northwestern portion of the North Plant. The former East and West Lagoons were constructed in 1972 and remained in use until 1997. The East and West Lagoons were used for the collection of process wastewater prior to treatment and discharge to the NCC POTW. They would function to control the water flow to the POTW during periods of excessive precipitation and function as containment basins in the event of an atypical chemical spill within the Facility.

The lagoons each measured approximately 100 feet in length, 140 feet in width, and 12 feet in depth. Each of the lagoons had a capacity of approximately 900,000 gallons. The lagoons were originally constructed of earthen walls with Hypalon™ liners. Constructed in 1972, the liners were replaced in 1979 and 1980 with a minimum 1/16-inch-thick EPDM synthetic membrane. The East Lagoon liner was subsequently replaced in early 1988 with 45-mil Hypalon™. The lining for the West Lagoon was replaced in 1989 with a polyethylene liner. The East and West Lagoons were constructed above and/or adjacent to the Past Landfill–Area IX (SWMU 21), which was reportedly used for disposal of pesticide wastes.

The former East and West Lagoons are the subject of a judicially imposed Consent Order with the DNREC (DNREC Legal No. 94-A-23). The Consent Order was executed on June 30, 1995. As a result of the Consent Order, GCC proceeded with closure activities for these units. Soils associated with and groundwater beneath the lagoons were characterized in 1995 and 1996. The results of these investigations are summarized in Section 1.5.1. With the permission of DNREC, the lagoons were removed from service in 1997.

The liquid was discharged through the existing EPS to the NCC POTW. Residual sludge (approximately 500 tons) and liners (22,500 square feet) were properly characterized and disposed. Upon removal of the liners, some material was found under the liners that appeared similar in nature to the sludges that had been removed from the lagoons. A modification to the Closure Plan was submitted by GCC to the DNREC in February 1999 that addressed, among other things, the remaining sludge. GCC then backfilled the lagoons according to the closure specifications in the modification to the Closure Plan. Backfilling included pushing the berms of the lagoons into the lagoon bottoms, placing clean fill over the displaced berm soils to bring the lagoon bottoms up to grade, and topping the area with gravel. Field inspections indicate that the lagoons are currently covered with gravel. It was agreed by GCC, the DNREC, and the USEPA that any remaining work would be incorporated into the scope of work for the RCRA Corrective Action Order, since the presence of SWMU 21 and 22 negatively influenced the ability to independently complete areal closure of the lagoons.

1.4.22 SWMU 31 – Spent Acid Lagoon

The former Spent Acid Lagoon is located in the northwestern portion of the South Plant. The former Spent Acid Lagoon was constructed in 1976 and remained in operation until 1997. The Spent Acid Lagoon was used as a containment basin in the event of an unintentional spill/release of sulfuric acid from the spent acid storage system located immediately to the north of the lagoon.

The Spent Acid Lagoon had outside dimensions of approximately 86 feet in length and 60 feet in width and inside dimensions of approximately 56 feet in length and 36 feet in width, and 6 to 8 feet in depth. The Spent Acid Lagoon had a capacity of approximately 157,000 gallons. The lagoon was constructed of earthen walls with a 10,000-square-foot 36-millimeter-thick liner.

The former Spent Acid Lagoon is the subject of a judicially imposed Consent Order with the DNREC (DNREC Legal No. 94-A-23). The Consent Order was executed on June 30, 1995. As a result of the Consent Order, soils associated with and groundwater beneath the lagoon were characterized in 1995 and 1996. The results of these investigations are summarized in Section 1.5.2. As related to the closure, GCC received a letter from DNREC stipulating no further action was required regarding soils and groundwater. In 1997, with the permission of the DNREC, the former Spent Acid Lagoon was removed from service by removing the materials and the liners and backfilling it with several inches of limestone gravel followed by clean fill and then topped with gravel. The residual liquids were discharged through the existing NPDES-permitted outfall and the sludges and liners were disposed off Facility at a permitted facility.

*Not
GW.*

To date, closure activities have met the requirements agreed upon by the DNREC and GCC. It was agreed by GCC, the DNREC, and the USEPA that any remaining work would be incorporated into the scope of the work for the RCRA Corrective Action Order.

1.4.23 SWMU 32 – Former UST Area

In December 1987, two 11,400-gallon USTs were removed. One of the USTs contained diesel fuel and the other one contained unleaded gasoline. The USTs were located in the west central portion of the South Plant near a truck scale (see Figure 2). The area is now covered with asphalt. Soil and groundwater characterization activities were performed following UST removal to determine potential impacts to the environment. The results of these investigations are summarized in Section 1.5.3.

1.4.24 AOC 1 – Tank 15 Spill Area

In September 1996, an approximate 1,500-ton spill of sulfuric acid occurred from Tank 15. Tank 15 is located on the west central portion of the South Plant of the Facility. Tank 15 is identified as AOC 1 in Figure 2. Tank 15 is surrounded by a concrete containment wall. On September 15, 1996, approximately 20 gallons of acid was found to have leaked from the containment wall for Tank 15 onto the surrounding ground surface. Further inspection indicated that approximately 1,500 tons of acid spilled onto the earthen floor within the Tank 15 containment area. From September 15 to September 20, the acid was pumped out of the containment area. Materials were neutralized in place and disposed off Facility. A minor amount of the acid leaked through the containment wall in one area. The incident report documenting GCC's response to the spill is contained in Appendix G. Investigation and cleanup activities were completed under the guidance of the DNREC.

1.4.25 AOC 2 – Acid Spill Area

On May 3, 1989, a spill of sulfuric acid occurred on the southern portion of the South Plant of the Facility. The spill originated from a crack in an aboveground pipe. It was estimated that approximately 1,000 to 15,000 gallons of sulfuric acid were spilled onto the ground surface over an area of approximately 6 feet by 20 feet. The approximate area of the spill is identified as AOC 2 in Figure 2. Subsequent investigation and remedial efforts were performed under the guidance of the DNREC. The results of these investigations are presented in Section 1.5.4.

As a result of the spill of sulfuric acid, in May 1992 GCC began operating a groundwater remediation system, consisting of groundwater pumping and treatment. The remediation system was shut down with DNREC approval when petroleum (unrelated to the spill) was observed in the pumping well.

1.4.26 AOC 3 – Pesticide Investigation/Remediation Areas (North Plant)

In 1976, Allied Chemical Corporation began investigations into the potential impact of pesticides on their B & A Works Facility, now called the North Plant. Pesticides were manufactured at the B & A Works Facility at that time. Media investigated included surface soils and associated storm water, conveyance solids, and surface water. The extent of the soil investigations are shown in Figure 3. Remedial actions were performed and included paving of a significant portion of uncovered soils and NPDES monitoring. Investigation and remediation activities were conducted primarily between 1976 and 1983. Additional details regarding the investigations and remedial actions are presented in Section 1.5.5.

1.4.27 AOC 4 – Conrail Fuel Spill Area

In the late 1970s, the fuel cell of a Conrail tank car was punctured, which resulted in the release of several hundred gallons of diesel fuel along the rail line immediately east of the Spar Building Storage Area (SWMU 5). According to GCC personnel, the spill was remediated by Conrail under the oversight of the DNREC. The approximate area of this spill is identified as AOC 4 in Figure 2.

1.5 Previous Investigations

This section summarizes previous environmental investigations that have occurred at the Facility and their findings regarding subsurface soil and groundwater quality. Previous investigations have occurred at seven SWMUs/AOCs and are summarized below:

- From 1976 to 1983, Allied Chemical Corporation performed extensive investigations and remediation activities within the North Plant, then called the B & A Works Facility, to determine the extent of pesticide releases and mitigate their impact to human health and the environment.
- From 1987 to 1989, Groundwater Technology characterized subsurface conditions at the Former UST Area (SWMU 32) located within the west central portion of the South Plant.
- From 1989 to 1991, CH₂M Hill characterized subsurface conditions at the Acid Spill Area (AOC 2) located within the southern portion of the South Plant.
- From 1995 to 1997, ERM characterized subsurface conditions at the East and West Lagoon (SWMU 30) located within the northwestern portion of the North Plant.
- From 1995 to 1997, ERM characterized subsurface conditions at the Spent Acid Lagoon (SWMU 31) located within the northwestern portion of the South Plant.

The work that was performed at the East and West Lagoons also provided soil and groundwater information regarding the Past Landfill–Area IX (SWMU 21) and Past Landfill–Area X (SWMU 22),

which are located in close proximity to the East and West Lagoons. Figure 2 presents the locations of the SWMUs/AOCs.

1.5.1 SWMU 30 – East and West Lagoons

As part of closure, soil and groundwater characterization activities were completed. Information regarding investigation activities associated with the East and West Lagoons were provided in the following documents:

- Background Soil Sample Results – Spent Acid Lagoon and E&W Lagoons, certified letter from GCC to the DNREC, dated February 13, 1996.
- Summary of Findings: First Quarter Groundwater Monitoring Event, Delaware Valley Works, ERM, dated December 1995.
- Statistical Evaluation of Groundwater Monitoring Program, ERM, dated February 1997.
- Modification to Closure Plan for East and West Lagoon, Environmental Alliance, Inc, February 1999.

In accordance with the 1995 Closure Plan, GCC installed five groundwater monitoring wells (identified as EWL-5 through EWL-9 in Figure 2) adjacent to the lagoons in September 1995. The first quarterly groundwater monitoring event occurred in October 1995 and the remaining three quarterly groundwater monitoring events were conducted in 1996. Groundwater samples from each of the five wells were analyzed for a modified Appendix IX list of parameters including VOCs, SVOCs, pesticides/herbicides, total and dissolved metals, and selected miscellaneous parameters. Analytical results are summarized in tables contained in Appendix H. As shown in the summary tables, VOCs, SVOCs, and pesticides were detected in groundwater from the monitoring wells. At Well EWL-8, during one of the four quarters of groundwater sampling, low levels of PCBs were also detected. It is believed that the detection of PCBs was an anomalous occurrence. PCBs were not utilized at this SWMU. In addition, PCBs were analyzed in several samples of liquid collected from the lagoons on June 11, 1991 (Appendix H). None of these samples detected concentrations of PCBs.

In accordance with the 1995 Closure Plan, soil samples were collected at four locations surrounding the lagoons in December 1995. The soil sampling locations were adjacent to Monitoring Wells EWL-6 through EWL-9. These samples were collected to provide background data for clean closure criteria as detailed in the 1995 Closure Plan. The soil samples were collected at depth intervals of 0 to 6 inches, 6 to 12 inches, and 12 to 18 inches bgs and analyzed for Appendix IX VOCs, SVOCs, pesticides/herbicides,

and inorganics. In addition, the soil samples were analyzed for the complete Toxicity Characteristic Leaching Procedure (TCLP) list of parameters, pH, and specific conductance. Soil sample results are presented in Appendix H. Appendix IX soil sample results indicate that pesticides (including alpha BHC, beta BHC, delta BHC, lindane, 4,4'-DDD, 4,4'-DDT, and 4,4'-DDE) were identified in one or more soil samples at each sampling location. With the exception of delta BHC, each of the pesticides mentioned above were detected above their respective USEPA Region III risk-based industrial soil cleanup criteria in one or more soil samples.

As presented in Figure 2, soil sample locations adjacent to Wells EWL-6 and EWL-8 are within the reported locations of SWMUs 22 and 21, respectively. These SWMUs were former landfills that reportedly collected pesticide residues (SWMU 21) and selenium-based wastes (SWMU 22). Selenium was not detected at elevated concentrations in any of the soil samples. The highest concentrations of pesticides were found in soil samples collected adjacent to Well EWL-7, located east of the lagoons. Based on the materials handled by the lagoons, it was concluded that the pesticides detected around the East and West Lagoons are related to historical landfills, and not releases from the lagoons themselves. Concentrations of pesticides detected in the soil samples adjacent to Well EWL-9 and Well EWL-7 suggest that materials within the landfills were likely distributed beyond their original boundaries during the construction of the lagoons.

In February of 1997, a statistical analysis of the groundwater data was submitted to the DNREC. Statistical analysis of the four quarters of groundwater data did identify a statistically significant difference in the concentration of one or more constituents in one or more of the monitoring wells downgradient of the lagoons (EWL-5, EWL-6, EWL-7, and EWL-9) compared to the background well for the lagoons (EWL-8). However, based on the types of constituents detected (pesticides and VOCs), and the historical landfill practices at SWMUs 21 and 22, it was concluded that their presence was not representative of releases from the lagoons.

1.5.2 SWMU 31 – Spent Acid Lagoon

As part of the closure activities, soil and groundwater characterization activities were completed. Information regarding investigation activities associated with the Spent Acid Lagoon were provided in the following documents:

- Background Soil Sample Results – Spent Acid Lagoon and E&W Lagoons, certified letter from GCC to the DNREC, dated February 13, 1996.

- Summary of Soil Sampling Results for the Spent Acid Lagoon, ERM, dated June 1996.
- Summary of Findings, First Quarter Ground Water Monitoring Event, Delaware Valley Works, ERM, dated December 1995.
- Closure of Spent Acid Lagoon, ERM, dated June 1996.
- Statistical Evaluation of Groundwater Monitoring Program, ERM, dated February 1997.

As part of the closure activities, GCC installed four groundwater monitoring wells (identified at SAL-1 through SAL-4 in Figure 2) adjacent to the lagoon in September 1995. The first quarterly groundwater monitoring event occurred in October 1995 and the remaining three quarterly groundwater monitoring events were conducted in 1996. Groundwater samples from each of the five wells were analyzed for the Appendix IX list of total and dissolved metals and selected miscellaneous parameters. Analytical results are summarized in tables contained in Appendix H. As shown in the summary tables, several metals including antimony, arsenic, beryllium, cadmium, chromium, and mercury were detected at slightly elevated concentrations. As agreed upon with the DNREC, these concentrations were attributed to Facility-wide conditions and not releases from the Spent Acid Lagoon.

Soil samples were collected from within and around the Spent Acid Lagoon on three occasions:

- In October 1995, soil samples were collected from within the Spent Acid Lagoon for closure verification. The soil samples were collected from depth intervals of 0 to 6 inches, 6 to 12 inches, and 12 to 18 inches. The soil samples were analyzed for total concentrations of chromium, TCLP VOCs, SVOCs, inorganics, pesticides, and herbicides, pH, and specific conductance.
- In December 1995, soil samples were collected adjacent to Wells SAL-1 through SAL-4 to determine background soil concentrations. The soil samples were collected from depth intervals of 0 to 6 inches, 6 to 12 inches, and 12 to 18 inches. These soil samples were also analyzed for TCLP VOCs, SVOCs, inorganics, pesticides, and herbicides, pH, and specific conductance.
- In April 1996, 13 soil samples were collected within and adjacent to the Spent Acid Lagoon as part of the determination that the metals concentrations in groundwater were attributable to Facility-wide conditions. One soil sample was collected adjacent to Wells SAL-1 through SAL-4 and nine soil samples were collected from within the Spent Acid Lagoon. The soil samples were collected at depth intervals of 0 to 6 inches, 6 to 12 inches, and 12 to 18 inches and were analyzed for Appendix IX metals, pH, and specific conductance.

Based on a statistical evaluation of the soil samples it was concluded that “clean closure” of the Spent Acid Lagoon was achieved. Analytical results for each of these sampling events are presented in Appendix H.

1.5.3 SWMU 32 - Former UST Area

In 1987, GCC closed two 11,400-gallon USTs located in the west central portion of the South Plant. The USTs contained diesel fuel and unleaded gasoline. As part of the closure activities, GCC contracted Groundwater Technology to perform a detailed assessment of the surrounding soils and groundwater to determine whether potential releases from the USTs may have impacted soil or groundwater. As part of the assessment, Groundwater Technology collected soil and groundwater samples. In addition, a quarterly groundwater monitoring program was implemented. The findings were summarized in a report entitled, Report of Findings for the Quarterly Groundwater Sampling Program, 1989, dated December 1989. A summary of the findings is presented below.

On January 15, 1988, three groundwater monitoring wells (identified as MW-1, MW-2, and MW-3 in Figure 2) were installed around the UST area. Well MW-1 was installed as a hydraulically upgradient well and Wells MW-2 and MW-3 were installed as hydraulically downgradient wells. The wells were installed to depths of approximately 16 to 22 feet bgs and communicated with the water table. Split-spoon soil samples were collected at the water table interface and analyzed for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and xylenes (BTEX), and polynuclear aromatic hydrocarbons. On January 16, 1988, the wells were inspected for the presence of lighter-than-water nonaqueous phase liquids and none was detected. Groundwater samples were subsequently collected on February 16, 1988 from the wells and analyzed for lead, BTEX, and TPH. Soil analytical results are summarized in Table 1-7 and groundwater analytical results are summarized in Table 1-8.

The results of soil and groundwater analysis indicated only minor impact to the surrounding soils or groundwater. In groundwater, total lead concentrations ranged from 0.13 milligram per liter (mg/l) in Well MW-2 to 0.97 mg/l in Well MW-1 with the highest concentration detected in the upgradient monitoring well. BTEX concentrations ranged from <10 micrograms per liter (µg/l) in Well MW-3 to 45 µg/l in MW-2. TPH concentrations ranged from <50 µg/l in Well MW-3 to 6 mg/l in Well MW-1. In soils, only C8-C10 aromatic hydrocarbon compounds, TPH, and benzene were detected in one or more soil samples above their respective method detection limits.

Minor concentrations of some chemical constituents were found in both soil and groundwater and concentrations of organic constituents in downgradient Well MW-2 generally exceeded those detected in upgradient Well MW-1. Therefore, a quarterly groundwater monitoring program was implemented to further evaluate the potential impact to groundwater from the USTs. In 1989, the three groundwater monitoring wells were sampled each quarter. The groundwater samples were analyzed for BTEX and TPH. The monitoring program also included the determination of the hydraulic conductivity of the shallow water-bearing deposits, groundwater elevation measurements for determining groundwater flow direction, and a sensitive receptor survey.

As shown in Table 1-8, downgradient Well MW-2 continued to show higher concentrations of BTEX for the initial two quarters (February and May of 1989) of sampling; however, the concentrations of BTEX constituents decreased substantially in subsequent sampling quarters. Groundwater Technology performed a sensitive receptor survey and concluded that groundwater proximal to the former locations of the USTs had been minimally impacted by petroleum hydrocarbons, and that the potential for petroleum hydrocarbon impact to sensitive receptors was negligible.

1.5.4 AOC 2 – Acid Spill Area

In May of 1989, a spill of sulfuric acid occurred at the southern portion of the South Plant of the Facility. It was estimated that approximately 1,000 pounds of acid was spilled on the ground over an area of approximately 6 feet by 20 feet. The approximate location of the spill is identified as AOC 2 in Figure 2.

Remedial activities, described below, were performed after obtaining concurrence with the DNREC. Initial remedial activity consisted of spreading soda ash over the area to neutralize the acid. The day following the spill, three small liquid streams were observed entering the Delaware River in the vicinity of the spill area. The pH of the streams was 0-1 as measured with pH indicating paper. Soda ash was immediately applied at the discharge points for neutralization. In addition, soil was excavated at the leak area to remove the source of contamination within the soils. A sand bag dike was also constructed in the river for tide control and containment. Following excavation of the soils, water from the tidal impoundment was pumped into the excavation area while adding soda ash to accelerate neutralization of the low-pH materials. The effectiveness of this measure reportedly diminished due to the reduced porosity of the soil from the soda ash treatment. Therefore, additional soil was excavated to provide a pathway for continued “flushing.”

Following stabilization of the release and addressing imminent hazards, and as agreed upon with the DNREC, a subsurface investigation was initiated to determine the extent of impact. Remediation activities associated with the Acid Spill Area are summarized in the February 1990 CH₂M Hill report prepared for GCC entitled, Data Collection for the Sulfuric Acid Spill Area.

Four groundwater monitoring wells (identified as B-1 through B-4) were initially installed in September 1989. In January 1990, three additional groundwater wells (identified as B-5, B-2D, and B-5D) were installed. Well locations are presented in Figure 2. Three groundwater sampling and analysis events were performed. On September 22 and October 17, 1989, shallow Wells B-1 through B-4 were sampled and analyzed. On January 31, 1990, Wells B-5, B-2D, and B-5D were sampled and analyzed. For each event the analytical program consisted of total and dissolved priority pollutant metals, pH, acidity as CaCO₃, total suspended solids, phosphorus, and sulfate. The analytical results are summarized in tables contained in Appendix H.

Groundwater was manually pumped from the excavation beginning on May 3, 1989 when the spill occurred. In May 1992, a remediation system began pumping and treating low-pH groundwater. Treated groundwater was discharged under the GCC NPDES permit to the NCC POTW until petroleum was encountered in one of the extraction wells. For this reason, GCC and the DNREC agreed that remediation should be discontinued.

1.5.5 AOC 3 – Pesticides Investigation/Remediation Areas (North Plant)

Attachments C and D in the 1986 RFA report referenced investigations and remedial actions implemented on the North Plant in the mid 1970s through the early 1980s in response to pesticide issues. At the time of the pesticide investigation and remedial actions, the entire North Plant was the B & A Works and was owned by Allied Chemical Corporation. During review of GCC files for the DOCC, additional information regarding these activities (e.g., locations of potential chemical burial facilities, soil sample location, and analysis results, etc.) were found. These findings are summarized in the following paragraphs.

Soil Investigation – Part I

In 1976 or 1977, a surface soil sampling and analysis program was performed throughout the B & A Works Facility. Soil samples were collected from along the outside of building walls that were uncovered (i.e., not paved). Typically, soil samples were collected from several locations along each building wall and composited. A total of 31 composite soil samples were collected and analyzed for kepone, DDE,

DDD, and DDT. Soil sample results are presented in Table 1-9 and soil sample locations are presented in Figure 3.

As shown in Table 1-9, DDE, DDD, and/or DDT were detected in surface soils in each of the 31 samples analyzed. The highest concentrations of DDE, DDD, and DDT were found adjacent to Building 18, currently located on GCC property and Buildings 10, 22, and 23 currently located on Honeywell property. Soils adjacent to Building 22 exhibited the highest concentrations. Building 22 was the primary DDT manufacturing building at the B & A Works Facility. Buildings 10 and 23 were located immediately east of Building 22. Kepone was detected in only seven soil samples, and the highest concentrations were found around Building 19 located on the eastern edge of the B & A Works plant.

Soils Investigation – Part II

In 1977, 30 additional surface soil samples were collected and analyzed for kepone, DDE, DDD, and DDT. The soil samples were reportedly collected from 0 to 6 inches bgs. As shown in Figure 3, the soil samples were collected primarily in the northcentral (around Buildings 22 and 23) and northwestern portions of the B & A Works Facility. Soil sample results are contained in Table 1-10.

As shown in Table 1-10, kepone was not detected above 5 milligrams per kilogram (mg/kg) in any of the soils samples. The highest concentrations of DDE, DDD, and DDT were again detected in soils in close proximity to Building 22 (Samples B-19 through B-22). The next highest concentrations of DDE, DDD, and DDT were detected in soil Samples B-8 through B-15, which are located in close proximity to SWMUs 23 (Past Landfill–Area XI) and 30 (Past Landfill–Area IX).

Soils Investigation – Part III

In 1977, three soil samples were collected on the Facility at a suspected pesticide burial location currently identified as SWMU 21 (Past Landfill–Area IX) and partially beneath SWMU 30 (East and West Lagoons). The soil samples were collected from a depth of approximately 5 feet bgs and were analyzed for BHC, DDE, DDD, DDT, and kepone. The exact locations of the soil borings were not identified. The analytical results for the soil samples are presented in Table 1-11. As shown in Table 1-11, kepone was not detected above the detection limit in any of the soil samples. Concentrations of BHC (including lindane), DDE, DDD, and DDT were detected in each of the soil samples.

Storm Water/Effluent/Conveyance Solids Sampling and Analysis

In 1977, storm water samples and plant process water effluent samples were collected and analyzed to determine the potential impact on this media from pesticide-containing surface and near-surface soil samples. Sampling locations or analytical data were not provided in the available documentation. Wet and dry weather sampling events were performed. In an internal memo, it was noted that the highest pesticide concentration detected was less than 5 µg/l total DDT and DDE within one of the storm sewer systems (Appendix J). Kepone was detected in only one of the sewer system samples. In addition, kepone and DDT were not found in Delaware River water intake samples or the effluent discharge to the NCC POTW. Documentation states that “analytical results of rain water runoff samples confirm the contamination of storm sewers by DDT and Kepone from areas surrounding the former manufacturing and storage sites.” However, no analytical data were available for either the storm water or effluent sampling and analysis.

In 1976 and 1977, aqueous samples were collected from Outfall 101, Naamans Creek, and conveyance solids from the sluiceway located on the South Plant. Sampling locations are not provided in the available documentation. The samples were analyzed for lindane and “other” BHC’s. A summary of the analytical data is within Attachment D of the RFA which is provided in Appendix A. Lindane and “other” BHCs were detected in storm water discharged from the plant. Surface water samples from Naamans Creek also detected concentrations of lindane and “other” BHC’s; however it should be noted that the “upstream” and “downstream” concentrations were similar. Finally, total BHC concentrations up to 1 mg/kg were detected in conveyance solids samples collected from the sluiceway located on the DVW – South Plant.

Remedial Action

In 1978, Allied Chemical Corporation paved a total of 5.4 acres of exposed ground adjacent to 11 buildings to eliminate direct-contact exposure and minimize the potential mobility of kepone, DDT, and/or its metabolites from soils to the surrounding environment. The areas Allied Chemical Corporation paved are presented in Figure 3. In addition, in June 1978 to December 1982, Allied Chemical Corporation accepted as part of its NPDES permit a “no net increase” for kepone and DDT and its metabolites. During this period, a total of 497 samples were collected and analyzed. Only 17 of the samples exhibited one or more of these constituents above the detection level and no individual compound exceeded 0.6 µg/l. In addition, none of the samples after March of 1980 exhibited any detectable concentrations of the pesticides. These data indicate that the remedial action was effective in eliminating the direct contact exposure and mobility of kepone, DDT, and/or its metabolites from soils to

the surrounding environment. NPDES sampling results are included in Attachment A of the RFA which is included in Appendix A.

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Tables

Table 1-1
Summary of Solid Waste Management Units and Areas of Concern
Delaware Valley Works Facility
Claymont, Delaware

SWMU/ AOC ID	Name	Years Used	General Description ⁽¹⁾	Current Status	Historical Data Available
SWMU 1	Phosphoric Acid Storage Pond (North Pond)	1960-1984	Inside dimension of approx. 50 feet by 60 feet and capacity of 100 net tons. Stored phosphoric acid from 1960 to 1971 and functioned as a wastewater equalization pond from 1972 to 1984. Wastewaters included sodium hydroxide process wastewater, storm water runoff and tank/car washings.	Closed in 1985 by backfilling with clean fill. Covered with gravel.	None.
SWMU 2	Phosphoric Acid Storage Pond (South Pond)	1960-1970	Inside dimension of approximately 30 feet by 91 feet and a capacity of 900 net tons. Stored phosphoric acid. Wastes accumulated included iron phosphate and muds removed for off-site disposal.	Closed in 1970 and effluent clarifiers (SWMUs 7 and 8) built on top of it. Remaining portion is asphalt covered.	None.
SWMU 3	Red Mud Slurry Pond A	1965-1971	Inside dimension of approx. 30 feet by 100 feet and a capacity of 120,000 gallons. Stored iron oxide that originated from the burning of pyrite ores. Liquids were drained to the sluiceway.	Closed in 1974 by backfilling with clean fill. Covered with asphalt, except possibly for the far western end.	None.
SWMU 4	Red Mud Slurry Pond B	1965-1971	Inside dimension of approx. 30 feet by 100 feet and a capacity of 120,000 gallons. Stored iron oxide that originated from the burning of pyrite ores. Liquids were drained to the sluiceway.	Closed in 1974 by backfilling. Covered with asphalt.	None.
SWMU 5	Spar Building Storage Area	1980-1990s	Storage area approximately 100 feet by 130 feet. Has asphalt base and fenced sides. Specific wastes stored included miscellaneous plant wastes, hypo muds, carbon and sand residues, waste oil and lubricants, acid sludges, and resin beads. These nonhazardous materials were stored in 55-gallon drums and subsequently disposed off site.	Currently asphalt covered. Plant debris and construction debris were piled on top of the asphalt. The piles were leveled and covered with gravel.	None.
SWMU 6	Drum Storage, South Treatment Plant	1980-present	Measures approx. 5,250 square feet. The area is either asphalt covered (70 feet by 65 feet) or concrete covered (28 feet by 25 feet). Housed off-grade nonhazardous sodium sulfite/sodium sulfate on wooden pallets.	Entire area is concrete or asphalt covered. Two areas show significant deterioration.	None.

Table 1-1
Summary of Solid Waste Management Units and Areas of Concern
Delaware Valley Works Facility
Claymont, Delaware

Page 2 of 5

SWMU/ AOC ID	Name	Years Used	General Description ⁽¹⁾	Current Status	Historical Data Available
SWMU 7	Effluent Clarifier Tank	1972-1990	The aboveground tank measures 30 feet in diameter and is 13 feet high for a capacity of approx. 69,000 gallons. From 1972 to 1982 it received treated process water from South Waste Treatment Plant neutralizer. From 1982 to 1990 it was used as a waste effluent clarifier.	Present but no longer in use. Ground surface around tank is covered with asphalt.	None.
SWMU 8	Effluent Clarifier Tank	1972-1982 1985-present	The aboveground tank measures approximately 25 feet in diameter, 10 feet high, and has a capacity of approximately 37,000 gallons. Used to settle alum muds from 1972 to 1982 and to store sulfate muds from 1985 to present.	Active. Ground surface around tank is covered with asphalt.	None.
SWMU 10	South Waste Treatment Storage Pad	1982-present	The pad housed dumpsters containing nonhazardous waste treatment muds subsequently disposed off site. Prior to 1982 the location housed a phosphoric acid plant.	Concrete pad covered with gravel.	None.
SWMU 11	Waste Oil AST	1983-present	Located within the powerhouse in the South Plant and has a capacity of 1,500 gallons. Approx. 2,500 gallons of waste oil is managed per month.	Active.	None.
SWMU 12	Waste Oil UST	Uncertain	Was located outside the garage on the South Plant and has a capacity of approx. 1,000 gallons.	Removed in the early 1970s and the area is paved with asphalt.	None.
SWMU 16	Past Landfill - Area IV	1972-1977	Consisted of 2 excavations, each measuring about 10 feet long, 8 feet wide, and 6 feet deep. A total of 75 tons of waste solvents generated during packaging operations were reportedly disposed.	Backfilled and covered with gravel.	None.
SWMU 21	Past Landfill - Area IX	1960	Consisted of two excavations, each measuring approx. 200 feet long, 9 feet wide, and 6 feet deep. Approximately 400 tons of wastes were reportedly buried. Wastes reportedly included BHC's, lindane, and DDT and its metabolites.	Partially covered with crushed stone and partially covered with asphalt.	Data available primarily from closure activities for East and West Lagoons (SWMU 30). Limited data also from the Pesticide Investigation/ Remediation Area (North Plant).

Table 1-1
Summary of Solid Waste Management Units and Areas of Concern
Delaware Valley Works Facility
Claymont, Delaware

Page 3 of 5

SWMU/ AOC ID	Name	Years Used	General Description ⁽¹⁾	Current Status	Historical Data Available
SWMU 22	Past Landfill - Area X	1958-1959	Consisted of an excavation measuring approx. 200 feet long, 50 feet wide, and 10 feet deep. Reportedly used for disposal of selenium-contaminated spent excelsior and cellulose following processing for selenium recovery.	Covered with crushed stone.	Data available primarily from closure activities for East and West Lagoons (SWMU 30).
SWMU 23	Past Landfill - Area XI	1945-1974	Consisted of an excavation measuring approx. 10 feet long, 4 feet wide, and 1 foot deep. Reportedly used for disposal of development lab wastes (approx. 0.5 tons). Wastes reportedly included various acids, kepone, BHC's, DDT and its metabolites, various inorganic salts, and halogenated and nonhalogenated solvents.	Backfilled in 1974 and reportedly covered with asphalt in 1978. Currently covered with gravel.	None.
SWMU 24	RCRA Storage Area	1968-present	Measures a total of approx. 4,810 square feet. It was primarily used for storage and packaging of perchloric acid. In 1983, reported wastes stored there included BNSA muds, organic strippers, waste solvents, and oximino silane waste. From 1985 to present, managed hazardous wastes for less than 90 days.	Active.	None.
SWMU 25	Sulfuric/Oxalic Storage Tanks	1967-1988	Consists of two ASTs approx. 13 feet in diameter and 12 feet high with a capacity of approx. 12,000 gallons each. Stored nonhazardous spent sulfuric acid and oxalics.	Taken out of use in 1988. Closed and dismantled in 1990. Area currently paved with asphalt.	None.
SWMU 26	South Waste Treatment Plant	1972-1982	The main portion of the Treatment Plant was a building measuring approx. 100 feet long and 26 feet wide. The plant was used to neutralize and reduce solids loading in effluent streams from sulfuric acid, alum, hydrofluoric, and fluoride manufacturing processes. Generated a solid waste consisting of a dewatered sludge consisting of gypsum that was placed in SWMU 9 located on AlliedSignal property.	Plant building dismantled in 1982. Area covered with asphalt.	None.

Table 1-1
Summary of Solid Waste Management Units and Areas of Concern
Delaware Valley Works Facility
Claymont, Delaware

SWMU/ AOC ID	Name	Years Used	General Description ⁽¹⁾	Current Status	Historical Data Available
SWMU 27	Environmental Protection Station - North	1972-present	Consisted of various units used in the management of process wastewater. The system has a capacity of processing up to 1,500,000 gallons per pay and typically generated about 75,000 pounds of solid waste each month.	Active. Area around neutralizer tanks and clarifier tanks covered with gravel.	The East and West Lagoons (SWMU 30) were historically part of the EPS. Data are available for these SWMU.
SWMU 28	Hypo Muds Accumulation	1973-present	SWMU consists of two areas dumpsters which managed the nonhazardous waste generated by wastewaters from photo-salt manufacturing processes being oxidized and the suspended solids are removed by vacuum filtration.	Active. Covered with gravel.	None.
SWMU 30	East and West Lagoons	1972-1997	The lagoons measured approx. 100 feet long, 140 feet wide, and 12 feet deep. Were used for the collection of process wastewater prior to the treatment and discharge to the POTW.	Closed. Closure activities included removal and off-site disposal of sludge and soils from the lagoon bottoms, soil and groundwater sampling and analysis. Backfilled with clean fill and topped with gravel.	Data available from closure activities for the lagoons.
SWMU 31	Spent Acid Lagoon	1976-1997	The lagoon measured approx. 56 feet long and 36 feet wide. The lagoon was used as a containment basin for accidental spills or releases from the spent acid storage system located south of the lagoon.	Covered with gravel. Closure activities included removal and off-site disposal of sludge and soils from the lagoon bottom and soil and groundwater sampling and analysis.	Data available from closure activities for the lagoon.
SWMU 32	Former UST Area	1952-1987	Area contained two 11,400 gallon USTs.	The USTs were closed in 1987 and the area is currently paved. As part of closure soil and groundwater was characterized.	Data available from closure of the USTs.

Table 1-1
Summary of Solid Waste Management Units and Areas of Concern
Delaware Valley Works Facility
Claymont, Delaware

Page 5 of 5

SWMU/ AOC ID	Name	Years Used	General Description ⁽¹⁾	Current Status	Historical Data Available
AOC 1	Tank 15 Spill Area	NA ⁽²⁾	In September 1996, approx. 1,500 tons of sulfuric acid were released from Tank 15 into the secondary containment area. Minor amount was released from containment area.	Materials were neutralized in place and cleanup was performed under the direction of DNREC.	Incident Report generated by GCC.
AOC 2	Acid Spill Area	NA	In May 1989, approx. 1,000 pounds of sulfuric acid were spilled and impacted soil and groundwater.	Cleanup activities were performed under the direction of DNREC.	Data available from assessment and remediation of spill area.
AOC 3	Pesticide Investigation/ Remediation Areas (North Plant)	NA	Between 1976 and 1983, an investigation and subsequent remedial actions were performed on the North Plant. Media characterized included soils, storm water, conveyance solids, and surface water.	Remedial actions included paving of exposed surface soil areas and monitoring of facility storm water effluent.	Raw data available for various investigations.
AOC 4	Conrail Fuel Spill	NA	In the late 1970s, the fuel cell of a Conrail tank car was punctured, releasing several hundred gallons of diesel fuel.	Cleanup activities performed by Conrail.	No data available.

Notes:

⁽¹⁾ Additional details regarding the SWMUs are contained in Section 1.4 of the text.

⁽²⁾ NA = Not applicable.

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**Table 1-2
Summary of Permits
Delaware Valley Works Facility
Claymont, Delaware**

Permit No.	Description	Agency-Type	Expiration	Comments
DE0000655	NPDES	DNREC-Water	2/28/03	Last Rev. 3/01/98
WDP 92-080	New Castle County	NCC-Water	6/20/03	Last Rev. 6/21/98
<u>North Plant</u>				
PA 23-313-009A	Fluoroborate Scrubber	DNREC-Air	8/31/98	
PA 23-313-012	Mikro Mill	DNREC-Air	1/31/98	
PA 23-313-025	Fluoride Mfg (HF Scrubber)	DNREC-Air	1/31/00	
PA 23-399-003	Maintenance Shop Cyclone	DNREC-Air	7/31/98	
APC 82/232	EPS Pneumatic Lime Unload	DNREC-Air	NA ⁽¹⁾	Not used since 90
APC 83/768	Metallic Nitrates Process	DNREC-Air	NA	
<u>Sulfuric</u>				
APC 80/362	Sulfuric Acid Plant	DNREC-Air	11/15/99	
APC 82/596	Oleum Venturi Scrubber	DNREC-Air	NA	
APC 82/872	H2S Pipeline	DNREC-Air	NA	
APC 83/116	Fluorsulfonic Acid Scrubber	DNREC-Air	NA	
<u>ABS Building</u>				
APC 81/348	S-A Unloading System	DNREC-Air	NA	
APC 81/730	Bag Packaging Operations	DNREC-Air	NA	Last Rev. 3/7/97
APC 82/270	North ABS Gasser Scrubber	DNREC-Air	NA	Last Rev. 4/6/98
APC 82/271	North ABS Rotoclone (tanks)	DNREC-Air	NA	
APC 82/272	Dryer Rotoclone	DNREC-Air	NA	
<u>Ammo/Hypo/Sulfite Building</u>				
APC 85/056	Ammon. Thiosulfate Plant	DNREC-Air	NA	Beco Scrubber's
APC 82/1203	Sod. Thiosulfate	DNREC-Air	NA	Dust Collectors
APC 80/363	Sodium Sulfite	DNREC-Air	NA	
APC 83/444	Tank Truck Unloading	DNREC-Air	NA	
<u>Sulftech Building</u>				
APC 81/588	Sulftech - S-A silo	DNREC-Air	NA	
APC 81/729	Sulftech - Gasser Scrubber (2)	DNREC-Air	NA	
APC 82/036	Sulftech - Ribbon Blending	DNREC-Air	NA	
APC 81/233	S-A System/Trucks (river)	DNREC-Air	NA	Not used
<u>Other Processes</u>				
APC 81/252-258	Boiler No. 1-7	DNREC-Air	NA	
APC 80/407	Cold Degreasers	DNREC-Air	NA	
<u>Others</u>				
SL-0603.95	Subaqueous Land Permit	DNREC-Dock	11/20/05	Last Rev. 11/20/95
MD 16/96	Maintenance Dredging	DNREC-Dredge	2/20/98	Last Rev. 2/20/97
0809910028.1	Landfill Water Quality Cert.	NJDEP-Dredge	11/13/02	Last Rev. 11/13/97
CENAP-OP-R-90-2427-1	Weeks Marine Dredge Permit	USCG-Dredging	12/31/02	Last Rev. 3/31/92
030-11139\37-01961-2	Materials License	USNRC	6/30/02	Last Rev. 7/2/96

Note:

⁽¹⁾Per DNREC legal notice dated October 18, 1982, expiration date reference in these permits were deleted. Renewal will occur when Title V permit is issued.

Table 1-3
List of Contacts
Delaware Valley Works Facility
Claymont, Delaware

Contact	Agency	Contact Information	Comments
Stephanie Baxter	Delaware Geological Survey	Phone (302) 831-2833 Personal Office Visit	Site-Specific Geologic Information Well Search Information
Jerry Kauffman	University of Delaware Water Resources Agency	Phone (302) 831-4928 Personal Office Visit	Regional Contamination Information Wellhead Protection Water Use Restriction Statutes
Jackie Young	DNREC Water Supply Division	Phone (302) 739-3665	Well Search Information
Stephanie Bruning	NCC Department of Land Use	Phone (302) 395-5400	Cultural Features (Historic Sites)
Joseph M. Abele	NCC Department of Land Use	Phone (302) 395-5400 Personal Office Visit	Current And Future Land Use Zoning Population And Growth Patterns Demographics Historical or Recent Development Patterns
NCC Mapping Department	NCC Department of Land Use	Phone (302) 395-5400 Personal Office Visit	Floodplain Map Zoning Map Property Map Soils Map
Rick Mickowski	New Castle Conservation District	Phone (302) 832-3100	Aerial Photograph
Al Palmer	Delaware State Museum	Phone (302) 739-5316	Cultural Features

Table 1-4
Monitoring Well Installation and Status Summary
Delaware Valley Works Facility
Claymont, Delaware

Well ID	Location	Date Installed	Total Depth (ft/bgs)	Screened Interval (ft/bgs)	Subsurface Material Monitored	Current Status
EWL-5	South side of East Lagoon	9/26/95	17.0	7.0-17.0	Alluvium	Unidentified in Field
EWL-6	South side of West Lagoon	9/27/95	16.0	6.0-16.0	Alluvium	Unidentified in Field
EWL-7	West side of West Lagoon	9/26/95	14.5	4.0-14.0	Alluvium	Existing
EWL-8	North side of Lagoons	9/26/95	13.0	3.0-13.0	Alluvium	Existing
EWL-9	East side of East Lagoon	9/27/95	17.0	6.0-16.0	Alluvium	Unidentified in Field
SAL-1	North of Spent Acid Lagoon	9/25/95	24.0	14.0-24.0	Alluvium	Existing
SAL-2	Southeast corner of Spent Acid Lagoon	9/28/95	17.0	7.0-17.0	Alluvium	Destroyed
SAL-3	Southwest corner of Spent Acid Lagoon	9/29/95	19.0	9.0-19.0	Alluvium	Existing
SAL-4	East side of Spent Acid Lagoon	9/29/95	21.0	10.0-20.0	Alluvium	Existing
MW-1	Northeast of Former UST Area	1/15/88	15.8	NA	Alluvium	Abandoned
MW-2	Southwest of Former UST Area	1/15/88	21.2	NA	Alluvium	Abandoned
MW-3	Southeast of Former UST Area	1/15/88	22.0	NA	Alluvium	Abandoned
B-1	North of Acid Spill Area	9/14/89	24.0	4.0-14.0	Fill	Existing
B-2	Immediately north of Acid Spill Area	9/13/89	16.0	8.5-13.5	Fill	Existing
B-2D	Immediately north of Acid Spill Area	1/16/90	54.0	15.5-21.5	Alluvium	Existing
B-3	Immediately east of Acid Spill Area	9/13/89	17.0	3.5-13.5	Fill	Existing
B-4	Immediately west of Acid Spill Area	9/13/89	32.0	4.0-14.0	Fill	Existing
B-5	North of Acid Spill Area	1/9/90	16.0	4.0-14.5	Fill	Existing
B-5D	North of Acid Spill Area	1/19/90	54.0	44.0-54.0	Alluvium	Existing

Table 1-5
Water Table Elevations
Delaware Valley Works Facility
Claymont, Delaware

Date	Well Identification																
	EWL-5	EWL-6	EWL-7	EWL-8	EWL-9	SAL-1	SAL-2	SAL-3	SAL-4	MW-1	MW-2	MW-3	B-1	B-2	B-3	B-4	B-5
Measured	(31.46) ⁽¹⁾	(31.76)	(32.42)	(35.86)	(31.48)	(27.44)	(22.36)	(18.66)	(20.86)	(20.00)	(19.78)	(20.01)	NA	NA	NA	NA	NA
1/14/90	- ⁽²⁾	-	-	-	-	-	-	-	-	-	-	-	4.94	4.87	4.82	4.68	4.72
2/3/89	-	-	-	-	-	-	-	-	-	16.88	16.52	16.51	-	-	-	-	-
5/3/89	-	-	-	-	-	-	-	-	-	16.79	16.42	16.47	-	-	-	-	-
6/6/89	-	-	-	-	-	-	-	-	-	16.81	16.6	16.67	-	-	-	-	-
8/14/89	-	-	-	-	-	-	-	-	-	16.75	16.5	16.44	-	-	-	-	-
11/10/89	-	-	-	-	-	-	-	-	-	16.67	16.46	16.45	-	-	-	-	-
11/27/89	-	-	-	-	-	-	-	-	-	16.41	16.15	16.26	-	-	-	-	-
10/1/95	22.76	24.31	26.30	33.58	24.45	19.44	17.04	12.52	12.76	-	-	-	-	-	-	-	-
1/25/96	23.37	25.29	26.46	35.53	24.34	19.95	17.00	12.14	9.49	-	-	-	-	-	-	-	-
4/24/96	22.06	24.97	26.39	33.54	23.69	20.53	16.90	12.36	15.72	-	-	-	-	-	-	-	-
7/24/96	21.94	24.76	25.98	33.57	23.88	20.35	17.06	12.35	12.96	-	-	-	-	-	-	-	-

Notes:

⁽¹⁾ Measuring point elevation.

⁽²⁾ Dash denotes not measured.

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Table 1-6
Estimated Hydraulic Conductivity Values
Delaware Valley Works Facility
Claymont, Delaware

Well Identification	Hydraulic Conductivity (cm/sec)		Lithology Screened
	Test No. 1	Test No. 2	
Acid Spill Area (AOC 2)			
B-1	2.2×10^{-2}	4.1×10^{-2}	Gravel and Sand Fill
B-2	2.3×10^{-2}	2.0×10^{-2}	Gravel Fill
B-3	4.7×10^{-4}	4.1×10^{-4}	Fill
B-4	1.4×10^{-3}	9.3×10^{-4}	Silt (Fill)
B-2 ⁽¹⁾	7.5×10^{-6}		Silt (Alluvium)
B-2D	6.9×10^{-4}	7.2×10^{-4}	Sand Alluvium (upper)
B-2D ⁽¹⁾	8.0×10^{-7}		Silt Alluvium (upper)
B-5	1.4×10^{-1}	5.1×10^{-2}	Gravel Fill
B-5D ⁽¹⁾	7.2×10^{-7}		Silt Alluvium (lower)
B-5D	2.1×10^{-3}	2.2×10^{-3}	Sand Alluvium (lower)
Former UST Area (SWMU 32)			
MW-1	4.16×10^{-5}	- ⁽²⁾	Alluvium
MW-2	5.40×10^{-4}	-	Alluvium
MW-3	4.02×10^{-4}	-	Alluvium

Notes:

⁽¹⁾Vertical hydraulic conductivity obtained from a Shelby Tube sample.

⁽²⁾Dash denotes not tested.

Table 1-7
Soil Sampling Results
Former UST Area (SWMU 32)
Delaware Valley Works Facility
Claymont, Delaware

Parameter	Units	Field Sample Identification		
		MW-1 (4'-6')	MW-2 (10'-12')	MW-3 (9'-9.5')
TPH	mg/kg	830	110	490
VOCs				
Benzene	mg/kg	0.2	<0.1	<0.1
Toluene	mg/kg	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	<0.4	<0.4	<0.4
Xylenes	mg/kg	<0.8	<0.8	<0.8
Total BTEX	mg/kg	0.2	ND ⁽¹⁾	ND
C4-C12 Aliphatic Hydrocarbons	mg/kg	<6.8	<6.8	<6.8
C8-C10 Aromatic Hydrocarbons	mg/kg	10	<4.5	<4.5

Note:

⁽¹⁾ ND = None detected.

Table 1-8
Groundwater Sampling Results
Former UST Area (SWMU 32)
Delaware Valley Works Facility
Claymont, Delaware

Parameter	Units	Sample Identification														
		MW-1					MW-2					MW-3				
		(2/16/88)	(2/3/89)	(5/3/89)	(8/14/89)	(11/27/89)	(2/16/88)	(2/3/89)	(5/3/89)	(8/14/89)	(11/27/89)	(2/16/88)	(2/3/89)	(5/3/89)	(8/14/89)	(11/27/89)
Lead	mg/l	0.97	- ⁽¹⁾	-	-	-	0.13	-	-	-	-	0.19	-	-	-	-
TPH	ug/l	6,000	2,200	<500	800	900	<400	1,000	<500	<500	<500	<400	1,000	<500	<500	<500
VOCs																
Benzene	ug/l	4	4	8.9	5.9	7.8	28	203	390	3.2	34	<5	3	2.3	84	1.9
Toluene	ug/l	1	<1	<0.5	<0.8	1.5	3	16	130	0.5	1.6	<1	<1	<0.5	2.7	0.6
Ethylbenzene	ug/l	1	<1	<0.5	<0.8	<0.8	2	27	82	0.9	3.3	<1	<1	<0.8	8.1	<0.8
Xylenes	ug/l	4	<5	6	3	2.7	12	32	140	3.6	6.1	<3	<18	<1.7	9.6	<1.5
Total BTEX	ug/l	10	<11	14.9	8.9	12	45	278	742	8.2	45	<10	<23	<0.6	<0.5	2.5

Note:

⁽¹⁾Dash denotes not analyzed.

Table 1-9
Soil Chemistry Data
Pesticide Investigation-Part I (AOC 3)
Delaware Valley Works Facility
Claymont, Delaware

DDT 12
 DDE 8.4
 DDT 8.4

Sample ID	Parameter (mg/kg)						
	o,p-DDE	p,p-DDE	o,p-DDD	p,p-DDD	o,p-DDT	p,p-DDT	Kepona
B-1N	4.8	24	56	140	140	740	<1
B-1S	1.2	8	16	32	13	140	<1
B-1W	11	64	110	300	110	1,400	<5
B-3S	3.6	15	0.7	2.8	2	24	<0.1
B-10S	<5	28	90	200	140	1,300	<5
B-10W	26	60	1,000	1,300	360	4,200	<5
B-13E	1	8	11	28	13	140	<1
B-14N	2.4	20	38	84	84	780	46
B-14E	1	15	7	26	<1	100	220
B-14S	1.8	7	5	13	12	110	9.6
B-14W	0.3	2.2	2.4	5.4	3	40	0.8
B-17N	4	20	32	94	70	1,100	<1
B-17S	1.8	7.8	16	40	11	120	<1
B-17W	4.4	46	36	82	140	1,600	<1
B-18N	10	70	140	340	260	3,600	<5
B-18E	0.9	6.2	5.2	11	9.6	150	<0.1
B-18S	12	70	200	420	300	4,200	<5
B-18W	52	320	440	1,400	2,200	22,000	<50
B-19E	<1	<1	4.6	16	<1	3.4	22
B-19S	8.4	34	36	170	<5	780	2,200
B-19W	<0.1	0.1	1.2	3.4	<0.1	10	17
B-22N	<500	600	2,200	6,600	3,800	38,000	<500
B-22E	300	700	2,400	5,800	3,600	42,000	<100
B-22S	<50	150	420	1,100	380	4,000	<50
B-22W	<500	3,800	3,200	7,800	7,400	92,000	<500
B-22CB ⁽¹⁾	240	1,000	4,000	10,000	5,800	70,000	<100
B-23N	<100	<100	1,000	3,200	4,000	44,000	<100
B-23W	<100	<100	940	2,600	2,000	24,000	<100
B-24N	15	100	220	420	200	2,400	<10
B-24S	6.2	34	16	52	22	320	<1
B-LP ⁽²⁾	34	84	110	340	70	1,100	<5

Notes:

⁽¹⁾ Catch Basin.

⁽²⁾ Lab Pit.

Table 1-10
Soil Chemistry Data
Pesticide Investigation-Part II (AOC 3)
Delaware Valley Works Facility
Claymont, Delaware

Sample ID	Parameter (mg/kg)						
	o,p-DDE	p,p-DDE	o,p-DDD	p,p-DDD	o,p-DDT	p,p-DDT	Kepona
B-1	<5	<5	<5	<5	<5	20	<5
B-2	<5	<5	<5	20	<5	<5	<5
B-3	<5	<5	<5	<5	<5	20	<5
B-4	<5	<5	<5	20	<5	60	<5
B-5	<5	<5	<5	<5	20	20	<5
B-6	<5	<5	<5	<5	<5	20	<5
B-7	<5	<5	<5	<5	<5	<5	<5
B-8	<5	80	40	100	140	600	<5
B-9	40	120	<5	40	260	620	<5
B-10	80	520	220	700	200	640	<5
B-11	40	320	220	1,200	120	540	<5
B-12	40	180	20	40	280	1,000	<5
B-13	80	240	220	540	1,000	2,600	<5
B-14	20	100	120	460	140	540	<5
B-15	80	520	520	2,200	400	2,200	<5
B-16	<5	<5	<5	<5	<5	20	<5
B-17	<5	<5	<5	40	20	40	<5
B-18	<5	<5	<5	8	4	20	<5
B-19	20	200	160	460	400	2,400	<5
B-20	100	800	580	2,000	4,200	16,000	<5
B-21	100	360	1,000	2,800	1,800	7,000	<5
B-22	40	600	200	640	800	3,200	<5
B-23	<5	40	40	100	60	280	<5
B-24	<5	60	100	280	380	1,600	<5
B-25	<5	<5	<5	20	20	80	<5
B-26	<5	40	<5	10	10	40	<5
B-27	<5	<5	<5	<5	<5	6	<5
B-28	20	60	40	160	60	260	<5
B-29	<5	<5	<5	<5	<5	20	<5
B-30	<5	8	6	20	12	40	<5

Table 1-11
Soil Chemistry Data
Pesticide Investigation-Part III (AOC 3)
Delaware Valley Works Facility
Claymont, Delaware

Sample ID	Parameter (mg/kg)												
	a-BHC	b-BHC	g-BHC	Lindane	Total BHC	o,p-DDE	p,p-DDE	o,p-DDD	p,p-DDD	o,p-DDT	p,p-DDT	Total DDE, DDD, DDT	Kepona
Treatment Plant (South Side)	92	16	7.8	11	130	78	220	78	140	19	310	840	<0.02
Treatment Plant (North Side)	25,000	8,700	1,900	7,400	43,000	56	200	100	120	30	170	680	<0.02
Treatment Plant (West Side)	260	79	21	17	380	24	88	35	63	22	260	490	<0.02

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